Products Finishing

CLEANING

PLATING

POLISHING

FINISHING

NOVEMBER 1951

Noted auto maker

USES Cincinnati WASHER

for "pre-plating" cleaning

One of the "big-three" auto manufacturers, in one of its divisions, uses this Cincinnati Cleaning Machine to clean radiator grille brightwork before plating. Use of the Cincinnati Machine at this point in the production line graphically illustrates the effectiveness of this scientifically designed equipment.

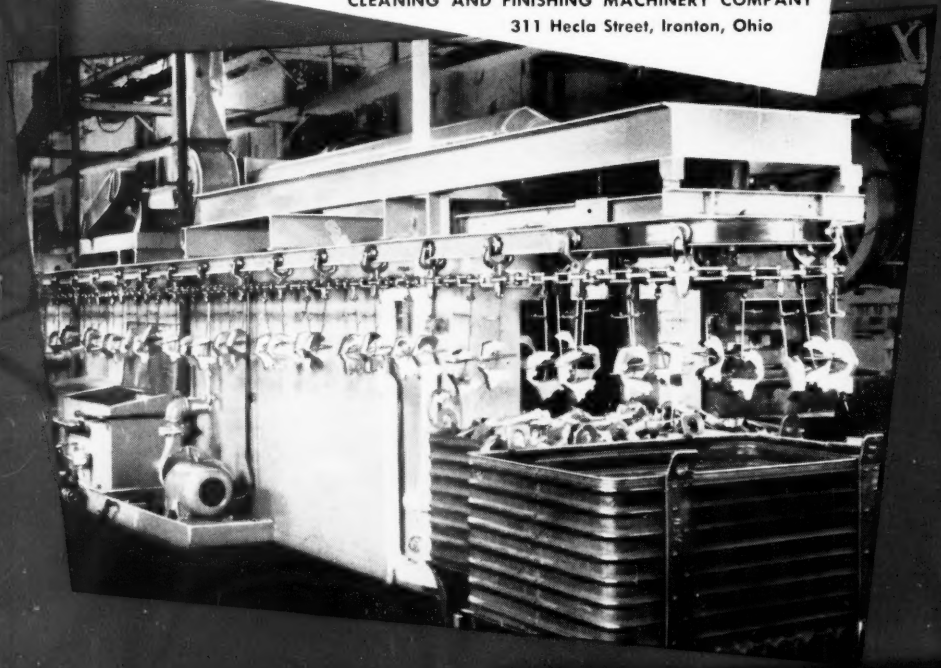
In a remarkably compact machine, parts receive a one minute wash and a half-minute rinse before being carried on the plant monorail to the plating operations.

Significant savings . . . up to 50 per cent in time, materials and labor . . . have been reported by Cincinnati Cleaning Machine owners. For additional information or a no-obligation survey of your own cleaning problems, call in a Cincinnati engineer. Write today for free catalog.

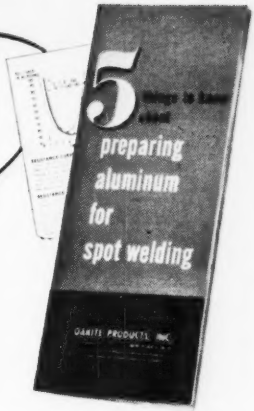
Cincinnati ©

CLEANING AND FINISHING MACHINERY COMPANY

311 Hecla Street, Ironton, Ohio



IS YOUR
SURFACE RESISTANCE
LOW ENOUGH?



Are your spot welding costs low enough?

This 18-page illustrated booklet tells how to get better surface preparation of aluminum before spot welding.

¶ Have you tried the latest Oakite recommendations for cleaning and deoxidizing Alclad 24S? 52S? 2S? 61ST-4? XB 75ST? 301? *See pages 3 to 8.*

¶ How long should these alloys remain in the deoxidizing solution? *See Immersion Charts on pages 9 and 10.*

¶ What effects do different immersion times have on resistance? *See Resistance Curves on page 11.*

¶ What's the best rinse temperature after cleaning? after deoxidizing? *See page 12.*

¶ Do you have efficient controls for the concentration and temperature of your cleaning and deoxidizing solutions? *See page 14.*

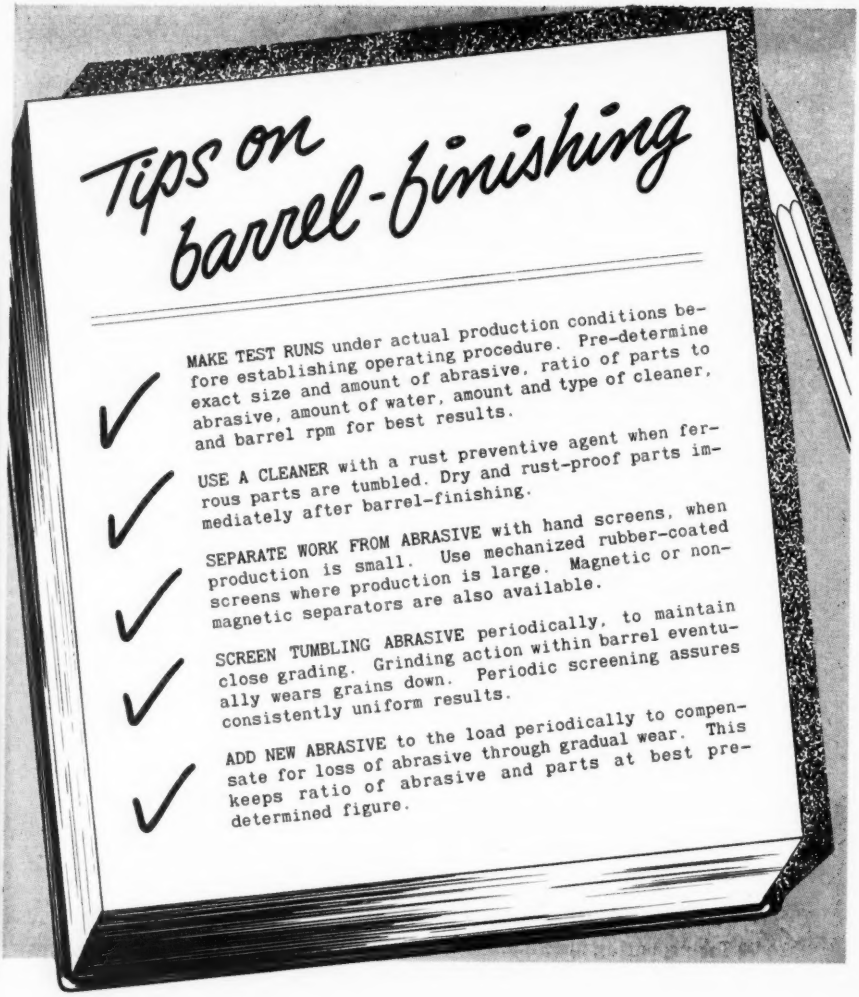
¶ What advantages should you insist on when selecting materials for preparing aluminum for spot welding? *See page 17.*

FREE For your copy of *"5 things to know about preparing aluminum for spot welding"* write to Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE TRADE MARK REG. U.S. PAT. OFF.

SPECIALIZED INDUSTRIAL CLEANING
MATERIALS • METHODS • SERVICE


Tips on barrel-finishing
MAKE TEST RUNS under actual production conditions before establishing operating procedure. Pre-determine exact size and amount of abrasive, ratio of parts to abrasive, amount of water, amount and type of cleaner, and barrel rpm for best results.
USE A CLEANER with a rust preventive agent when ferrous parts are tumbled. Dry and rust-proof parts immediately after barrel-finishing.
SEPARATE WORK FROM ABRASIVE with hand screens, when production is small. Use mechanized rubber-coated screens where production is large. Magnetic or non-magnetic separators are also available.
SCREEN TUMBLING ABRASIVE periodically, to maintain close grading. Grinding action within barrel eventually wears grains down. Periodic screening assures consistently uniform results.
ADD NEW ABRASIVE to the load periodically to compensate for loss of abrasive through gradual wear. This keeps ratio of abrasive and parts at best predetermined figure.

SPECIFY Norton ALUNDUM* Tumbling Abrasive for continuous cutting action — fast, positive cut — long, productive life. If you do not have barrel-finishing equipment, let Norton make test runs for you — at no obligation. Whether or not you have equipment, get your copy of Norton's new, informative, free booklet "Barrel-Finishing with ALUNDUM Tumbling Abrasive" — full of practical hints. Ask your Norton distributor or representative for Form 501. Or write us direct.

NORTON COMPANY, Worcester 6, Mass.
Distributors In All Principal Cities

NORTON
ABRASIVES
Making better products to make other products better

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

PLATEMANSHIP
H-VW-M's unique combination of:
. . . the most modern and complete laboratory for testing and development
. . . ability to provide complete equipment and materials for every plating and polishing need
. . . the complete background of knowledge and experience in every aspect of plating and polishing.
PLATEMANSHIP PLUS PR & WES-X FOR UNEQUALED
bright copper plating
...it gives smoother, brighter deposits
...it has exceptional levelling properties
...it permits higher current densities
...it reduces labor costs

that's why it's the most practical substitute base for chrome plating

The PR Process* plus Wes-X addition agent meet, to a remarkable degree today's requirements for a heavier, brighter cyanide copper deposit as a substitute undercoating for chrome. The high levelling properties of the PR and Wes-X copper deposit eliminates in most cases the need for buffing. Steel and die cast parts can move without interruption directly from copper to chrome. When buffing is necessary it becomes a mere wiping operation.

PR employs the principle of periods of current reversal during a conventional plating operation. Wes-X is an addition agent of inorganic, metallic compounds, including cyanides. Its use completely eliminates organic additions to the bath. The bath is outstanding in its ease of control. All constituents can be accurately analyzed. The metal and chemical content is not critical, permitting a wide latitude in operation.

By varying the concentration of Wes-X, the composition of the plating solution and the PR cycle, cyanide copper deposits of any desired physical properties can be produced.

Investigate this revolutionary process now, it may be the answer to your present chrome plating production. For full details ask for bulletin on "Technical Instructions for the H-VW-M Bright Copper Plating Process."

PR plus Wes-X is another facet of H-VW-M's *Platemanship*—the ability to meet every requirement of the industry in all phases of pickling, polishing, buffing, cleaning, anodizing and plating.

*PR Plating Process is a development of Westinghouse Electric Corp., covered by Patents #2451340 and #2451341. License agreements are available through H-VW-M.

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, NEW JERSEY

PLANTS AT MATAWAN, N. J. • ANDERSON, INDIANA • SALES OFFICES ANDERSON • BOSTON • CHICAGO CLEVELAND • DAYTON • DETROIT • GRAND RAPIDS • MATAWAN • MILWAUKEE • NEW HAVEN NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SPRINGFIELD (MASS.) • STRATFORD (CONN.) • UTICA

H·VW·M

7918

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

EGYPTIAN

INDUSTRIAL FINISHES

Quality IS NEVER COMPROMISED

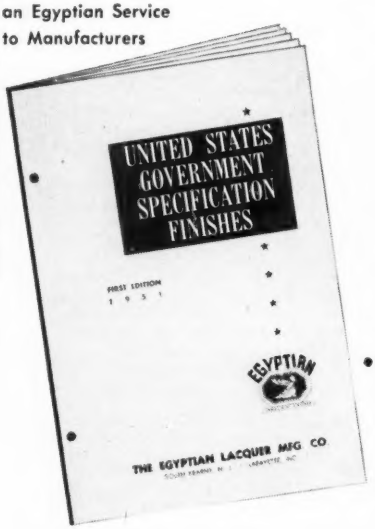
Emergency restrictions on materials for the manufacture of consumer goods are multiplying production headaches for You and Egyptian. Delivery delays are inevitable. These we must learn to live with... *but* at Egyptian, despite existing restrictions, even the thought of compromising with quality or deviating from specifications is unforgiveable.

If you are confronted with the problem of developing a finish to lengthen the life of your product . . . one to perk up sales, a finishing system to speed up production . . . one to cut costs . . . or a formula to meet rigid defense specifications your best bet is to consult an Egyptian Industrial Finishes Specialist.

Let his specialized knowledge work out your problem within the confines of Egyptian's "NO COMPROMISE WITH QUALITY POLICY."

SYNTHETICS • LACQUERS • VARNISHES • ENAMELS

Distributed Free as an Egyptian Service to Manufacturers



•• YOURS FOR THE ASKING

The Egyptian U. S. Government Specification Finishes Booklet is a must if you are engaged in defense work. Request your copy on your company letterhead. Please state your title.

THE EGYPTIAN LACQUER MFG. CO.

Box 444, Newark 1, New Jersey

Plants: South Kearny, N. J. • Lafayette, Ind.

EZRA A. BLOUNT, *Editor*
(On leave of absence
U. S. Air Force)

Products finishing

NOVEMBER 1951
VOLUME 16 • NUMBER 2

CONTENTS

A Program for Personal Progress 11
Editorial

Finishing Procedures at Erie Art Metal 12
By Walter Rudolph

Pickling and Electroplating Beryllium-Copper Alloy Components 23

Cleaning With Sound Waves 52
By John Starr

Spotlighting Finishing Progress
By Dr. Allen G. Gray

—Basic Research and Test Methods Applied to Organic Finishes 60

Highlights of the American Electroplaters' Society's Research Program 88
By Donald Price

Finishes That Aid in Appearance and Utility . . 102

News of the Industry 104

New Equipment, Materials, Processes 112

The Finishing Touch 126

Opportunity Section 127

Index to Advertisements 128

FRANK L. BONEM
Associate Editor

H. LEROY BEAVER
ALLEN G. GRAY
BRYANT W. POCOCK
Consulting and Contributing Editors

GENE J. SCHWARBER
Advertising Manager

NORMAN S. ROGERS
Art Director

L. V. SONENSCHEIN
Circulation Manager

ADVERTISING REPRESENTATIVES

RICHARD S. KLINE
GEORGE E. HAY
431 Main St., Cincinnati 2
MAin 0182

G. M. FILLMORE
DUNCAN W. BARTON
342 Madison Ave., New York 17
Murray Hill 7-7390

JOHN M. KRINGS
Tribune Tower, Chicago 11
DElaware 7-5441

THE ROBERT W. WALKER CO.
2330 West Third Street
Los Angeles 5
DUnkirk 7-4388
57 Post Street, San Francisco 4
SUtter 1-5568

MEMBER

CCA NBP

Published monthly and copyrighted (1951) by

GARDNER PUBLICATIONS, INC.
431 Main Street, Cincinnati 2, Ohio
Printed in U.S.A.

ONE MAN OPERATION with BLAKESLEE METAL PARTS WASHERS

ONE SPOT
LOAD and UNLOAD

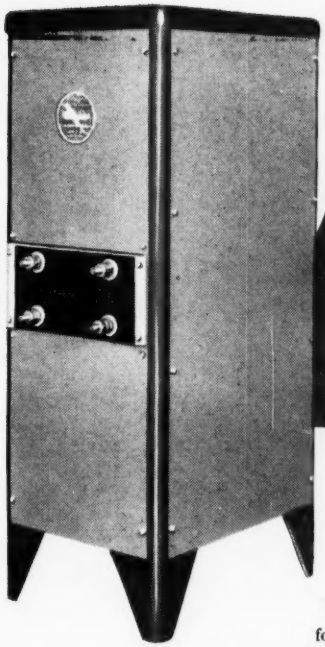
BLAKESLEE SOLVENT VAPOR DEGREASERS
—economical, efficient—
USE LESS SOLVENT

BLACOSOLV
Stabilized Degreasing Solvent — one price, one solvent *for all metals*

Blakeslee's new washer saves labor, is economical

Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

G. S. BLAKESLEE & CO.
1844 S. 52nd Avenue • Chicago 50, Illinois



Udylite
SELENIUM RECTIFIERS
last longer –
WORK BETTER AT LOWER COST

These new Udylite Selenium Rectifiers are built for top performance at high current densities. They're designed and engineered to give long, efficient service under tough usage. Actual factory-supervised tests prove this fact! A number of selenium stacks were operated continuously for 10,000 hours at the ambient temperature of 35° C at rated loads. Voltage output at the end of this grueling test was 98% of initial value. In addition, Udylite Selenium Rectifiers offer all of these other outstanding features:

- **Compact, to save space and weight.**
- **Approximately 6,000 sq. in. of rectifying area.**
- **Wide range in combinations of standard sizes.**
- **From a few amperes to thousands of amperes.**
- **Permanent characteristics.**
- **Immune to atmospheric changes.**
- **Adaptable to any type circuit or load.**
- **High efficiency per unit weight.**
- **Economical in cost and operation.**
- **Simple to install and operate.**
- **No moving parts, no maintenance costs.**

Have your nearby Udylite Technical Man give you the complete story about Udylite-Selenium Rectifiers. Or write to *The Udylite Corporation, Detroit 11, Michigan*, for literature describing these units. There's no obligation.

PIONEER OF A BETTER WAY IN PLATING

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

YOUR METAL REARMAMENT PRODUCTS can be HANDLED and CLEANED Mechanically
• EFFICIENT DEFENSE PRODUCTION Calls For • • EFFICIENT CLEANING METHODS! • •

★ this new booklet

★ shows HOW TO CLEAN AND HANDLE METAL REARMAMENT PRODUCTS *Mechanically!*

IT ANSWERS THESE AND HUNDREDS OF OTHER QUESTIONS:

★ What's the fastest and best way to wash, rinse and dry Cartridge Cases?

★ How can cyanide be removed quickly and thoroughly from hardened Gun Parts?

★ What is the most efficient method of removing grease from shells?

★ What is the best way to wash and dry Rifle Parts and Shell Fuses?

★ Quenching oil! How can it be removed quickly and thoroughly?

★ What is the fastest way to clean dis-assembled Motor Parts?

★ Write for Your FREE Copy—Today!

ALVEY-FERGUSON

Washing Machines for Industry

THE ALVEY-FERGUSON CO.,

633 Disney St. Established 1901 Cincinnati 9, Ohio

Tape it with Behr-cat

Those neat, sparkling two-tone finishes are easy when BEHR-CAT No. 111 Tape masks the color separation. This thin tape sticks tight and holds paint build-up down to a minimum. When stripped off, BEHR-CAT Tape comes clean and leaves a fine, smooth edge. It s a time saver and output booster for any masking job. Use it, too, for stenciling, protecting, sealing, reinforcing, and holding loose parts in assembly. BEHR-CAT Tape is a well-balanced, all-purpose tape that is fast winning friends for all these jobs.

YOUR SPECIAL TAPE PROBLEM is welcomed at BEHR-MANNING. Our fully staffed laboratories are at your service. Put us to the test. Write today. Address Dept. PF-11.

BEHR-MANNING

division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

Main Office and Plant: Troy, N. Y.
Canada: Behr-Manning (Canada) Ltd., Brantford, Ont.
Export: Behr-Manning Overseas, Inc., New Rochelle, N. Y.

Cowles A M CLEANER

THE NEW NON-ETCHING TYPE ALUMINUM CLEANER FOR USE IN SOAK TANK CLEANING

THE NON-ETCHING CLEANER THAT REALLY CLEANS

It was specifically designed to remove drawing, stamping, spinning compounds, rolling oils, marking inks, crayon marks and general shop dirt from common aluminum alloys prior to spot welding, anodizing or other finishing operations.

COWLES TECHNICAL SERVICE
Readily Furnished Upon Request

TRY COWLES A M CLEANER FOR A BETTER, QUICKER JOB OF CLEANING ALUMINUM

WRITE FOR TECHNICAL DATA SHEETS

PROMPT SHIPMENTS FROM WAREHOUSE STOCKS

COWLES CHEMICAL COMPANY
METAL CLEANER DEPARTMENT
7016 Euclid Avenue • Cleveland 3, Ohio

NOTE Try Cowles P.C. Cleaner if you want a cleaner that really gives a rapid etch.

pf editorial

Vol. 16, No. 2

NOVEMBER, 1951

Program For Personal Progress

There are two ways of being a boss!

One way is to try to run the whole show, personally supervising every detail of the operation of the department or function, leaving no authority or responsibility to subordinates. Under such conditions the morale of the assistants concerned is necessarily low, it is difficult to find AND KEEP qualified assistants, operating efficiency is not high, and the continuity of the organization is in constant jeopardy.

Further, such a supervisor often complains that he is neglected when opportunities for advancement present themselves. He does not realize that by refusing to impart his knowledge to his subordinates, and by not training them to take over his own duties, he has chained himself to his job and blocked his own progress.

The more progressive supervisor realizes that his value to his company is directly proportional to his ability to delegate his duties—successfully—to his assistants. Therefore, he makes every effort to pass along his accumulated knowledge and experience, creating in his subordinates not only the desire to make progress, but a feeling of certainty that their advancement is dependent only upon their ability to absorb information and grow in management stature. Such a program of training develops the confidence of the subordinate in his own ability to perform his boss's job, should it suddenly be thrust upon him. Morale under such conditions is high, because each man knows that his advancement is not a haphazard possibility but a part of a definite plan.

The company in question benefits by receiving a greater share of each man's potential ability, and by the insurance thus provided, of a continually growing team of qualified executives.

Let each supervisor consider the fact that by training, educating, and USING his assistants, he can prepare himself for greater responsibilities and pave the way for his own advancement.

Finishing Procedures At Erie Art Metal

By WALTER RUDOLPH

ERIE Art Metal Co., Inc., Erie, Pa., has been fabricating sheet metal products since 1908, when its founder, W. H. Knobloch, patented a metal basket. Some 500,000 metal baskets are now produced annually, along with very diversified job lots of cabinets, bond boxes, panels and other products. As can be imagined, finishing problems at this plant form an important phase of plant operations.

Metal baskets themselves, flowing continuously from the well tooled press department, require no polishing prior to degreasing for painting. Some smoothing, however, is required on bond box weldments, for instance, and on corners of deep draws. Where considerable arc welding has been done on a product, often a small hammer is used to chip scale from weld lines.

Polishing of welds and drawn corners is done with Thor portable air-powered machines. When the cabinet or bond box can be held by the worker against the wire polishing wheel, the tool is placed in a stand for the work. Considerable polishing is also done at electrically-powered lathes or polishing jacks. The latter are coupled with dust collectors to remove dust formed in polishing.

It should be noted that hydraulically-powered lifts, or hand trucks, are widely used in this plant, along with modern skids, for swiftly moving batches of baskets and other products from one operation to another.

Formerly, degreasing at Erie Art Metal was at one side of a large working area. The degreasing area is now enclosed, or partitioned off, from other sections of the plant.

The degreaser sits in the approxi-

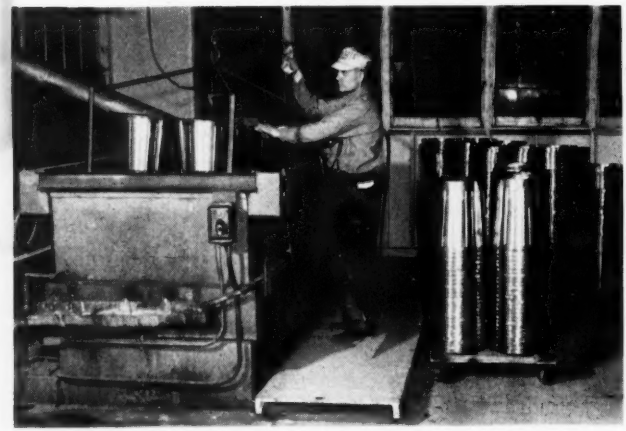


Fig. 1—Steel baskets are degreased in this Detrex vapor degreaser.

mate center of a room about 25 by 35 feet, under an I-beam monorail arrangement for moving a small hoist that lowers and raises the degreasing rack (see Fig. 1). Baskets or other parts are cleaned in a Detrex degreasing unit, 36 by 36 by 84 inches, by means of the vapor degreasing process.

Study revealed that 100 pounds, whether of baskets or other products, could best be degreased at one time in the degreaser. Only a few minutes of fogging are required per load, and products come out dry and clean, ready for unloading and movement to the paint department.

Painting Operations

As baskets are the volume item in this plant, their handling through the painting department can serve as a typical example of plant processes. Baskets are transported to and from painting booths, ordinarily, on plant-fabricated, four-wheeled racks, easily handled by workers, and easily accommodated by the paint drying oven.

Four DeVilbiss paint spray booths occupy one side of the paint room, totaling an overall length of 42 feet. Blowers at the rear of each booth have a capacity of 18,000 cu. ft. of exhaust air each per hour. Paint goes to guns from 5-gallon pressurized tanks, or 55-gallon drums, as the situation requires (see Figs. 2 and 3).

In addition to the paint finishes used, sound-deadener is also applied, according to specification, on cabinets for instance. It is sprayed from 55-gallon drums with the pumping mechanism mounted on top of a special lid. Applications are usually $\frac{1}{16}$-inch thick to eliminate the "tinny" effect when a cabinet or panel is hit, or vibrates; after coating with sound-deadener, a wooden sound effect is achieved.

Erie Art Metal has devoted considerable study to the regulation of air that enters the paint room, to establish

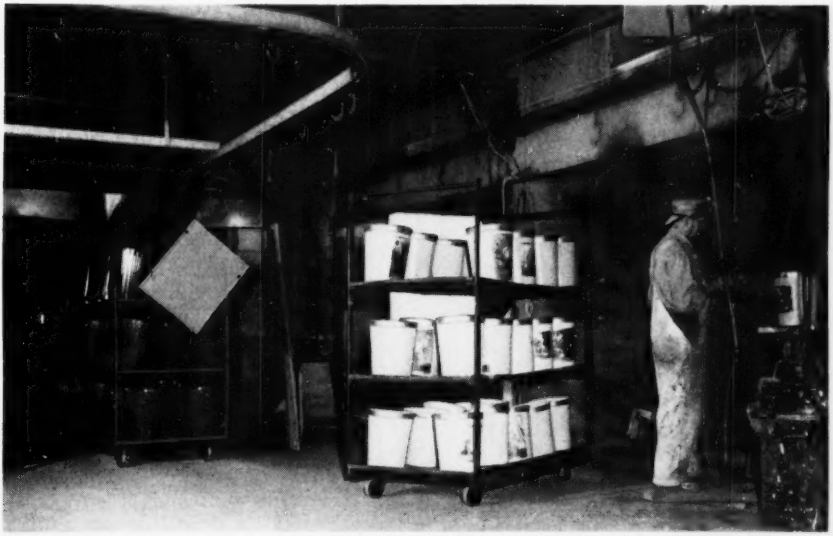


Fig. 2—Overhead Richards-Wilcox conveyor pulls painted metal baskets through gas-heated (oil standby) drying oven, left; baskets with colorful paper panels are lacquered, right. Note hanging of panel on conveyor.

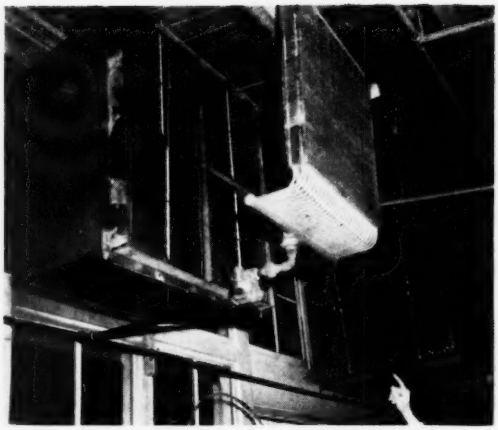


Fig. 4—To heat incoming air that is drawn from roof of plant, this steam radiator unit from jacket of regulation heater was installed in front of filter, just inside the paint room.

and maintain conditions that will aid the production of high quality finishes—free from imperfections. Four blowers are used, two pulling air from outside the plant and two from the plant interior. All incoming air passes through filters. A slight pressure is maintained in the spray room to prevent shop dust from being drawn into the room.

To bring outside air to more nearly room temperature, it is made to strike a radiator coil after leaving the filter (Fig. 4). This coil was removed from the jacket of a standard, steam-heated blower-type room heater, of the type suspended from a plant ceiling.

It is interesting to note that the four-blower setup was arrived at by constant experimentation when the present paint room was first established. With just one blower for incoming air, heat was drawn from the drying oven, one end of which opens into the paint room. A second, and finally a third and fourth blower were added, gradually equalizing and slightly bettering the ratio of incoming to outgoing air.

Care must be exercised constantly in regard to the filters fronting the blowers for incoming air—if they become overloaded with dirt, the volume of incoming air is lessened, and heat is dissipated from the oven to equalize the flow of air into the paint room.

The 55-foot conveyorized drying oven, designed and installed by the Lanly Company, can handle diversified sheet metal products. Gas-heated air is con-

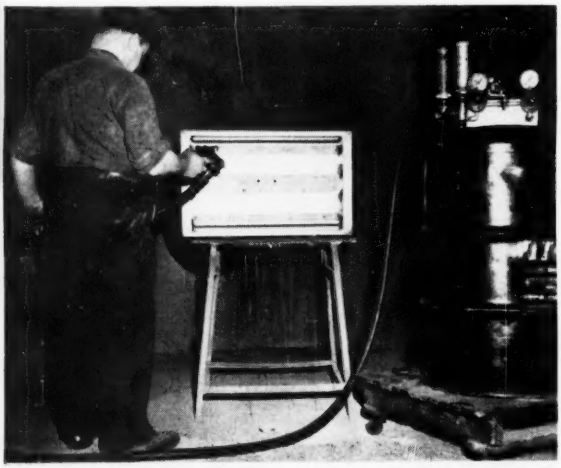


Fig. 3—Sound-deadening is accomplished with 1/16-inch coating of special material, sprayed from barrel that is topped with its own power unit; custom cabinet work requires this procedure.

Fig. 5—A pump and electric motor are mounted as a portable unit, ready for instant switch-over of the gas-heated oven to oil-heating; connections are made to the firing jet at this end of heating arrangement, and to pipe that runs to underground oil storage tanks.

stantly circulated to maintain a temperature of 290 deg. F., and paint manufacturers who supply Erie Art Metal are asked to prepare paints that will set up or dry during a 45-minute travel through this oven (Fig. 2).

As Erie is located in a section of the country that suffers weather extremes during winter months, and the gas supply becomes very skimpy at such times, Erie Art Metal has provided an oil standby system of heating for its drying oven. Four tanks totaling 1100 gallons oil capacity are buried just outside the plant, assuring a month's oil-heating if necessary.

The oil is piped into the plant under the floor. A portable pump is positioned near the fuel intake jet of the heating system at one side of the oven, and connection is established with the oil pipe in a short interval following a gas shut-down. The pump and the motor which powers it go into action at the flip of a switch, and oil heating of the oven is underway (see Fig. 5).

Parts are carried through the conveyorized oven by means of heavy wire hooks which connect the conveyor chain, running along a monorail on the oven ceiling, and the large, castered racks that hold painted baskets. Diversified cabinet and switch panel parts, in another instance, are hung directly on the conveyor chain with the wire hooks.

Ordinarily, products get prime and finish coats; there are cases, of course, when specifications require priming, surfacer, and then several finish coats, a common procedure in a jobbing plant. Baskets are primed and then get

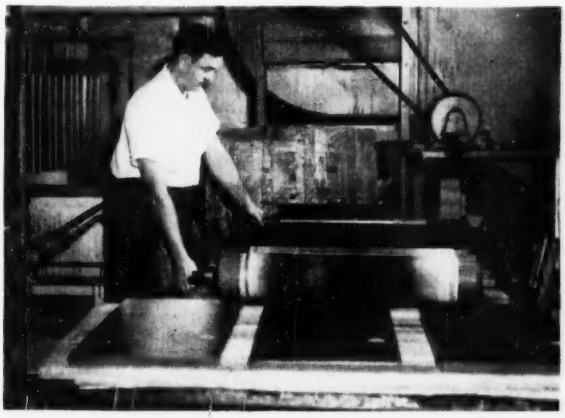


Fig. 6—Graining rollers are cleaned on this ingenious setup; roller will go from kerosene-wet rollers to canvas-covered pair, foreground. Flat panels that have been grained are shown.

Fig. 7—Closeup of the handwork that goes into gold-striping of paper-paneled metal baskets; wood glue holds paper firmly in place, achieving a very decorative effect.

finish coats, for the most part.

Some baskets of a better grade receive hand-graining, a procedure that has been efficiently worked out at Erie Art Metal. After priming and drying through the oven, the baskets receive a ground coat of walnut or mahogany. Then they are dried again and moved to the graining area.

Graining is done largely through the manual application of rubber graining rollers over the area in question. These rollers vary widely in diameter and length; from one to sixteen inches in diameter up to several feet in length. Graining ink, as it is termed, is first picked up on the rollers by rolling them over graining plates.

When cabinets or rectangular-shaped metal baskets are to be grained, they receive graining before final assembly, as it would be impossible to grain completely in corners, for instance, after complete assembly. The panels are simply laid out on a bench and the rollers applied.

Erie Art Metal has fabricated an ingenious arrangement for cleaning graining rollers (Fig. 6). Essentially, it consists of a solidly-constructed wooden rack for holding four rollers that are fastened into place. Below the first two rollers is a pan holding kerosene into which the rollers project so that they are constantly wet when revolving.

The second set of rollers is covered with several thicknesses of canvas. The worker places his soiled graining roller on the kerosene-wet rollers, removes the graining ink after several revolutions, and then places the roller on the canvas-surfaced rollers for instant drying.

When a layer of canvas becomes too soiled for further use, the worker simply cuts and removes a layer of canvas and continues with his work. All four rollers of the cleaning setup are powered by a sprocket chain that passes over cog wheels at one end of the rollers, the chain in turn gaining power from a ¼ h.p. electric motor located at one end of the work table. Reduction gears keep the chain moving at a moderate speed.

Grained products air dry and then go through the paint room for a coating of varnish, after which they are baked in the oven. Erie Art Metal has still another finishing variation for metal baskets in which they are primed, given a ground coat, and then receive colorful paper panels, some decorative trimming, and a final lacquering.

After the ground coat has been applied in the above finishing procedure, the baskets are hand worked. A coating of wood glue is applied to the back of a paper panel. This is a powdered glue to

NOW pre-color your metal products BEFORE fabricating

ENAMELSTRIP

STEEL, ALUMINUM, AND BRASS PRE-FINISHED

COLOR COIL

Users of Enamelstrip in continuous-feed coils completely eliminate such costly, time-consuming operations as hand feeding, shearing, cleaning, tumbling, spraying, dipping, rustproofing, baking, drying. Enamelstrip's exclusive pre-treatment and finishing process achieves a flexible, lustrous finish which withstands the stresses of drawing, bending and forming without cracking or peeling. Fabricate your metal parts and products from Enamelstrip to be sure of a smooth, glossy finish at reduced costs!

ENAMELSTRIP in any metal, any color, coated and precision slit to your specifications.

TODAY see how this important new development improves production . . . and profits! Write immediately for detailed descriptive bulletin to our National Sales Representatives:

THE COATED COIL CORPORATION

517 West 30th St., New York 1, N. Y. • Phone: LO 5-3161

which water has been added.

The paper is then placed on the basket's side, and a small plastic scraper is used to "squeegee" all the excess glue from beneath the paper and fix it firmly onto the metal. The whole is wiped clean, and a strip of gold bronze is hand-painted around the decorative paper panel (Fig. 7). When this dries, the basket goes back to the paint room for the spraying of lacquer, and is dried in the oven.

A small amount of rubber stamping is done here, too. In this case, the worker merely "inks" the stamping pad and applies it to the side of a painted basket, fixing a hotel name, brand name, and so on.

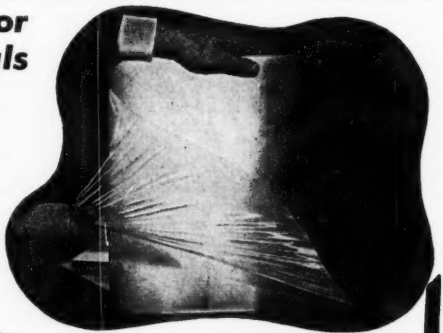
Speedy packaging for shipping of baskets is accomplished with cardboard cartons. A stack of baskets, each separated from another by paper, is placed on the floor; the open-end carton is slipped over the baskets, the top is glued shut with a paint brush application, paper tape seals the joints, the pile is reversed and the other end is treated in the same manner.

Custom fabrications of switch panels, cabinets, and so forth, are individually packaged according to need. In these cases, a prepared packaging aid is used to protect finished edges, wax paper is used on flat surfaces, and the whole is carefully crated.

In 1751, a Swedish scientist named Cronstedt obtained a sample of ore and succeeded in separating from it a metal previously unknown to science. He named the newly-discovered metal "Nickel." Until the beginning of the 20th century—in fact, well into this century—nickel was little appreciated and less sought after. To scientists, it was a metal twice as abundant in the earth's crust as copper, zinc, and lead combined. To civilization, until recent times, it might just as well not have existed.

A Strippable Plastic for the Protection of Metals

Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.



THE STRIPLASTIC COMPANY

Among many advantages, it is nontoxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

10828 QUEBEC AVE.
CLEVELAND 6, OHIO

TREATING WITH

PHOSPHATE?

Then treat your product right... with an Industrial Machine

Using **INDUSTRIAL** Equipment for washing, rinsing, slushing, phosphatizing, treating with Bonderite or other metal pre-processing operations is making a sound and sensible investment.

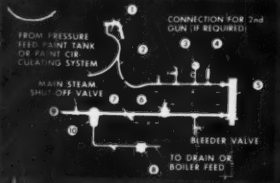
That's because **INDUSTRIAL** is a name that's synonymous with precision performance in metal finishing equipment throughout the industry. And, more important, **INDUSTRIAL** builds machines that considerably cut costs while maintaining required production and quality standards.

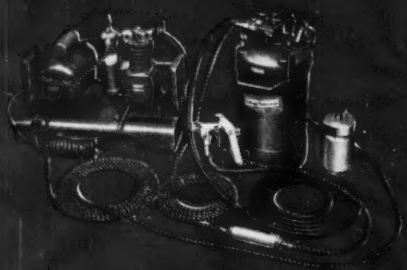
Complete facts, figures . . . even surveys and engineering consultation . . . are yours on request and without obligation. Address department T.

INDUSTRIAL
Washing Machine Corp.
New Brunswick
New Jersey

Specialists In Cleaning Equipment Design and Manufacture

From Steam Spray Gun


FROM PRESSURE FEED PAINT TANK OR PAINT OR CLEANING SYSTEM
CONNECTION FOR 2nd GUN (IF REQUIRED)
MAIN STEAM SHUT-OFF VALVE
BLEEDER VALVE
TO DRAIN OR BOILER FEED



To Air Spray Guns and Outfits

KELLOGG-AMERICAN

gives you operating advantages that mean quality finishing at low cost

For over 40 years, Kellogg-American has worked in product research. Results: Such revolutionary painting equipment as the cost cutting steam spray gun; and such product innovations as the remarkable mobile Auto-Bake drying oven and the dual-pressure air compressor. It is Kellogg-American policy to bring you better product performance through genuine operating advantages that improve painting efficiency—cut painting cost—simplify painting equipment and techniques. Any of the thousands of users of Kellogg-American products or any Kellogg-American jobber can tell you that this policy is more than a statement. It is a fact that has reduced costs and improved production for many industries. It will pay you to talk to your Kellogg-American representative about your painting equipment problem. Why not write today.

Write for product folder | **A 100 on Micro-Spray Gun or A 200 on Steam Spray**

KELLOGG DIVISION, 93 HUMBOLDT ST., ROCHESTER 9, N. Y.
DOMINION BRAKE SHOE COMPANY, LTD., NIAGARA FALLS, ONTARIO

AMERICAN **Brake Shoe** COMPANY

Pickling and Electro-Alloy

BERYLLIUM-copper has become an indispensible material in the lighter engineering industries. Until its availablity, steel had to provide the needs for a high tensile material. For small and delicate components, such as instrument springs, steel has not proved entirely satisfactory because of its corrodibility and corrosion-fatigue. It cannot be said that entire success has been met in the protective finishing of small spring steel articles. There is a limit to the thickness of coating that can be applied, and, in the case of electroplate finishes, this is usually below the minimum effective thickness that is necessary to assure serviceability under corrosive conditions. The plating processes, including the preparatory cleaning treatments, promote hydrogen embrittlement, which is not always fully removed by low temperature heat treatment. Alternative finishes principally consist of chemical or heat treatment coloring processes followed by oiling or greasing. These are only satisfactory for providing resistance to the milder corroding conditions. The advent of a nonferrous metal that could be fabricated into thin sheet, strip and tape, and into fine wire, that could be work-hardened by rolling or drawing, that could be softened by annealing for severe bending and drawing operations, and that could then be hardened in the piece-part form to give high tensile strength, rigid components, filled, in consequence, a real need in industry. The requirements for all "spring" parts, however thin or fine, or complex in profile, could be met at least as well by the new material as by the spring steels.

Compared with the plain carbon steels, the coppers and copper-rich alloys are relatively non-corrodible. Beryllium-copper is no exception to this rule; it is generally equal to copper itself, in some circumstances a little superior, in others a little inferior. Unlike steel, it can usually be employed in the unfinished condition, and the need for pickling and electroplating components from this metal may at first sight be queried. There are, however, essential reasons for such processes.

Several beryllium-copper alloys are employed in engineering, and several heat treatments may be involved. Space does not permit a discussion of these subjects, and it suffices for the present purpose to state that the most important of these materials is the 2 to 2½

Fig. 1—(a) Finger-marked brass after humidity test.

plating Beryllium-Copper Components

per cent beryllium content alloy. When necessitated, this is softened by quenching from about 800 deg. C., and hardened by quenching from 300 to 320 deg. C. Surface deterioration occurs in these processes, varying according to the conditions under which the treatments are carried out, and ranging from a greyish discoloration to a black scale. Controlled pickling is necessary for reconditioning the material or component, whether it is to be employed with or without an applied finish.

All copper-rich non-ferrous alloys undergo superficial deterioration, as far as appearance is concerned, when exposed to even normal atmospheric conditions. Loss of luster, discoloration and staining, and ultimately corrosion occur. Beryllium-copper behaves in this respect in a manner closely similar to that of copper. Dulling and tarnishing are the common symptoms, with blackening in sulfide atmospheres, and a tendency to greening in sulfurous industrial environments, and under the influence of salt in marine conditions. In some applications, therefore, an electroplate finish is required to maintain a standard of appearance if the component is assembled in an exposed position on the apparatus.

It must not be assumed from the previous paragraph that severe deterioration of these non-ferrous metals results under service conditions, because this is not the case. Some exposure test results can be cited in illustration of this point. In these, the commonly used metals are compared under similar conditions. They all behave somewhat similarly, and for particular purposes are chosen on the basis of their mechanical and physical properties, but in some cases in relation to relative corrodibilities. The metals tested are defined by their compositions in Table I, which also shows their hardness values. All specimens were of rolled sheet, thoroughly cleaned with fine abrasive paper and by degreasing with solvent before test. They include those extensively used in lighter engineering, especially the instrument and electrical industries. The beryllium copper is the 2-2½ per cent alloy employed for intricate springs. The copper is the high purity, high conductivity grade employed extensively in the electrical industries. The phosphor bronze is the ordinary 5 per cent tin alloy, used generally for springs. The aluminum bronze is the 10 per cent alloy that is hardenable by heat treatment, used for

Fig. 1—(b) Finger-marked (hands coated with French chalk) brass after humidity test.

TABLE I.

LABORATORY CHARACTERISTICS OF METAL USED FOR CORROSION TESTS.

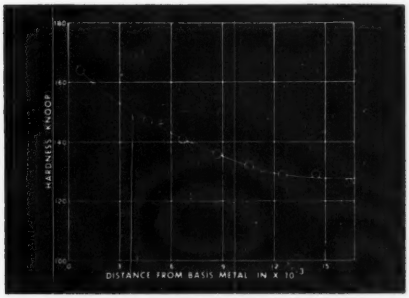
SAMPLE NO.	1	2	3	4	5	6	7	8
Metal	Beryllium Copper	Copper	Phosphor Bronze	Aluminum Bronze	Brass (64%)	Cupro-Nickel	Nickel Silver 18%	Nickel Silver 12%
Composition Per Cent.								
Copper	Remainder	Remainder	Remainder	Remainder	64.2	Remainder	57.3	59.2
Zinc	—	Traces	—	0.35	Remainder	Nil	Remainder	Remainder
Tin	—	Traces	5.1	Traces	Nil	—	Nil	Nil
Beryllium	2.10	Nil	—	—	—	—	—	—
Aluminum	—	Traces	—	10.32	Nil	—	Traces	—
Nickel	—	Traces	—	0.05	Nil	20.7	17.8	11.8
Cobalt	0.25	—	—	—	—	—	—	—
Silicon	0.06	Traces	—	—	—	—	—	—
Phosphorus	—	—	0.11	—	—	—	—	—
Iron	—	Traces	0.08	0.13	0.08	0.10	0.22	0.27
Lead	—	Traces	—	0.08	Nil	Nil	Nil	Nil
Manganese	—	Traces	—	0.05	—	0.10	0.04	0.03
Oxygen	—	0.029	—	—	—	—	—	—
Arsenic	—	0.006	—	—	—	—	—	—
Hardness DPN/5.	300	80	195	212	188	140	220	145

Some conditions that affect properties of Electrodeposits

A study of properties obtained by depositing nickel under various conditions reveals specific trends. In making each experiment only one condition was varied while all other factors remained constant.

EFFECT OF THICKNESS

As thickness varies, the variation in properties of deposits from the Watts type bath is especially significant. The variation of hardness, tensile strength and elongation is most pronounced with thin deposits, as shown in Figures 1 and 2.

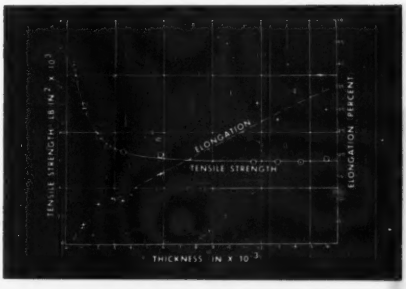


1. Variation in hardness of nickel deposit with position of indentation on cross section (Watts bath).

Tensile strengths of specimens, 0.0005, 0.001, and 0.007 inch, heated to 1000°C in vacuo for an hour, showed no variation with thickness, indicating that the differences in the metal as-deposited were caused by differences in the structure of the deposits and not by the thickness as such. In general, grain size of a deposit from the Watts bath increases with distance from the basis metal. In contrast, grain size of a deposit from the all-chloride bath did not vary with the thickness.

EFFECT OF *p*H

Harder deposits of nickel were obtained at the higher end of the *p*H range than at the lower end. Deposits from a Watts bath showed minimum hardness at 3 to 4 *p*H while deposits from an all-chloride bath increased continuously in hardness as the *p*H rose. Tensile strength varies with *p*H in approximately the same relationship as hardness.



2. Variation of tensile strength and elongation with thickness of nickel deposit (Watts bath).

A fund of data, important not only in electro-forming, but also in predicting performance of nickel plated articles, has been developed by the study.

A.E.S. RESEARCH PROGRAM

The American Electroplaters' Society is conducting a comprehensive research program and has developed useful information on current plating problems. International Nickel, in addition to its other support of this program, feels that it will be a further service to make copies of these A.E.S. Research Reports available.

We offer you a free copy of this authoritative, detailed, 21-page study. Simply fill in and return the coupon below.

SYMBOL OF INCO SERVICE

The International Nickel Company, Inc.
Dept. P, 67 Wall Street,
New York 5, N. Y.

Please send me a copy of A.E.S. Research Report, Serial No. 12 entitled "Physical Properties of Electrodeposited Metals."

Name..... Title.....

Company.....

Address.....

City..... State.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

its properties of resistance to wear and corrosion. The brass is an ordinary white brass employed for miscellaneous parts including simple springs that are not highly stressed. The cupro-nickel is a corrosion resisting alloy, not extensively used in instruments or electrical apparatus, but more employed in general and chemical engineering. The 18 per cent nickel silver is widely used in instrument and electrical work, and is the grade used for springs. The 12 per cent alloy is less expensive and less employed, and not generally used for springs.

Table II covers a standard form of salt spray test in which the specimens are exposed at room temperature in a cabinet to the mist formed by atomizing 20 per cent salt solution with compressed air. The specimens are protected from heavy droplets by baffle plates, and are obliquely arranged to receive maximum influence from the falling mist. The atomizer is operated during the 8-hour day, and the specimens left in the mist-laden cabinet overnight. Each morning they are rinsed in flowing main-water and dried on a soft cloth for examination.

Table III deals with a mild humidity test in which the samples are subjected to an atmosphere of 60 to 70 per cent humidity at 55 to 60 deg. C. during the 8-hour day, then cooling down to atmospheric temperatures at night, with rise in humidity to 100 per cent and condensation upon the specimens. Table IV relates to the same conditions but with the samples heavily finger-marked prior to testing.

The salt test can be regarded as representing severely corroding conditions. All the metals withstand these conditions well, with aluminum bronze perhaps outstanding, and beryllium copper and 18 per cent nickel silver not far behind in performance.

The humidity test represents accelerated mild exposure conditions. None

A TRIANGLE Infrared Batch Oven with fully automatic controls—bakes regular and wrinkle finishes on small metal parts.

You can get better, more uniform results
FAST AND ECONOMICALLY
in your
BAKING - DRYING
PREHEATING
with a
TRIANGLE INFRARED OVEN

You will save floor space, have a cleaner, safer department and less upkeep with an oven constructed of standardized parts, that will meet your most exacting requirements and that can be altered, with the minimum expense to meet changes in your production.

A time-temperature test involves no obligation.
A Catalog on request.

TRIANGLE EQUIPMENT CO., INC.
Designers, Engineers, Manufacturers
45 RIVER ROAD **NUTLEY, N. J.**

LOOK
what you get
WITHOUT
BUFFING

See the difference? Unbuffed control sample shows cloudy milky finish when copper is not treated with Iridite.

with IRIDITE® Metcote in
COPPER-CHROME FINISHING

This sparkling bright finish is the result of just a simple dip in Iridite Metcote between the copper and chrome plating cycles! You actually get the clear, bright appearance of copper-nickel-chrome because the Iridite treatment gives maximum brilliance and clarity to the copper undercoating.

FORGET BUFFING COSTS, PR PLATING! Once you've properly prepared the base metal . . . steel sheet or zinc casting . . . you can completely forget buffing costs because no further buffing is required! And, there is no need to resort to PR plating or extra brightener in the copper plating solution because of the chemical polishing action of Iridite Metcote.

PROVE IT YOURSELF! Send us samples of your product for test-processing with copper, Iridite Metcote and chrome. Then make your own inspection and tests. Once you've seen your own product treated with this Iridite finishing system you'll never go back to slower, more costly buffing for your bright finishing. Start saving money *now*—write us direct or call in your nearest Iridite representative. Look under "Plating Supplies" in your classified telephone directory.

Iridite is approved under government specifications.

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD

TABLE II.

RESULTS OF EXPOSURE OF COPPER-RICH NON-FERROUS METAL SPECIMENS TO SALT SPRAY TEST AT ROOM TEMPERATURE.

Specimen		Condition after exposure to salt spray for a period of:				
No.	Metal	1 day	1 week	2 weeks	4 weeks	6 weeks
1.	Beryllium Copper.	Lightly stained.	Very slight superficial green corrosion, with local heavier points or patches.	General greening still slight although more advanced.	General green corrosion rather heavier.	Green corrosion general but not deep.
2.	Copper.	Very slight greenish yellow tarnish.	— ditto —	— ditto —	— ditto —	— ditto, except green coloration more intense.
3.	Phosphor Bronze.	— ditto —	— ditto —	— ditto —	— ditto —	— ditto —
4.	Aluminum Bronze.	Very slight staining.	Isolated greenish spots and patches.	Corrosion not general, restricted to greenish patches.	Slight corrosion general.	General slight green corrosion with heavier patches.
5.	Brass (64%).	Slight staining.	Slight staining and isolated greenish patches.	White corrosion on a background of copper colored patches.	Corrosion heavier, with whitish products predominating.	General corrosion quite marked, but still whitish due to preferential attack on zinc.
6.	Cupro-nickel.	Slight green corrosion.	Green discoloration more intense in appearance.	Attack heavier.	Little further change.	General corrosion, although not heavy, color very green due to nickel compounds.
7.	Nickel Silver, 18%.	Unaffected.	Almost unaffected.	Slight pale green film of corrosion products.	Little further change.	Corrosion still slight, and discoloration pale in color.
8.	Nickel Silver, 12%.	Unaffected.	Yellowish stains and very slight pale green film.	Attack a little more intense.	Little further change.	No marked change, condition not quite so good as sample No. 7.

SMOOTHER POLISHING
means Easier going

Photographs courtesy Allis-Chalmers Mfg. Co.

EXOLON ABRASIVES

For Fast Polishing in All Types of Metal Finishing

● For smooth surfaces of moldboard plows and for any tool or equipment where smoothness means more effective work, EXOLON Aluminum Oxide Abrasives assure fast, uniform metal finishing. These chunky, durable grains are magnetically separated, carefully graded and shaped for polishing all types of tough metals, including spring steel, sheet metal, cold rolled stock, forgings and stainless steel. Ceramically coated for strong adhesion to the set-up wheel, EXOLON RST is the ultimate choice for efficient polishing.

Write for complete information on EXOLON Abrasives NOW

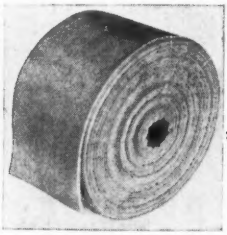
The EXOLON Company

943 EAST NIAGARA STREET TONAWANDA, NEW YORK

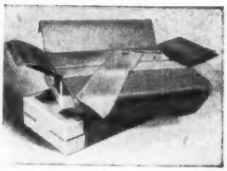
Manufacturers of Silicon Carbide and Aluminum Oxide Abrasives

of the cleaned specimens in Table III show real deterioration, and the marring of appearance is most marked in the high copper materials. The handled specimens in Table IV, with the exception of the phosphor bronze, show little difference in behavior, and all emphasize the dangers of localized corrosion and pitting from finger-marking. The latter is a serious problem in assembly shops, and most serious in hot humid weather. Figure 1 shows one photographic record from a study of operators during summer temperatures of 80 to 90 deg. F. and humidity about 80 per cent. The base metal is clean, buffed brass and the prints were taken at mid-day after lunch and after hands had been washed. They were "developed" by exposure to the humidity test for a week.

A second important reason for electroplate coatings is the reduction of the effect of bimetallic junctions to a minimum. Table V provides information upon the contact potentials of various metals. The values are the potentials of the individual metals immersed in sea water at room temperature when measured against a normal calomel half-electrode. The contact potential is of two metals in contact interpreted as being proportional to the difference potentials of the individual metals. Broadly speaking, the development of corrosion at the junction under service conditions is deemed to be greater the higher this contact potential value. This can only be taken as a general guide because conditions of passivity, or the development of passivity, as well as the specific nature of the corroding conditions, enter for consideration. Under dry conditions, as may exist in hermetically sealed apparatus, contact potential is of little consequence. Under severe corroding conditions, bimetallic junctions should be avoided. In intermediate circumstances, a maximum value of 0.25 or in mildly



IN ROLLS
Cut off any size piece and use as needed.



CUT BULK
Already cut and folded, ready to use.

NOW! Tack Cloth in Handy Rolls or Cut Bulk

Now you can get Tack Cloth packed the way it's easiest for you to use—either in 150 yard rolls of 36" wide cloth or in handy cartons—100 or more Tack Cloths to the carton.

No matter which way you buy it, you can be sure that every square inch will *stay* SOFT and TACKY until the very last bit is used up.

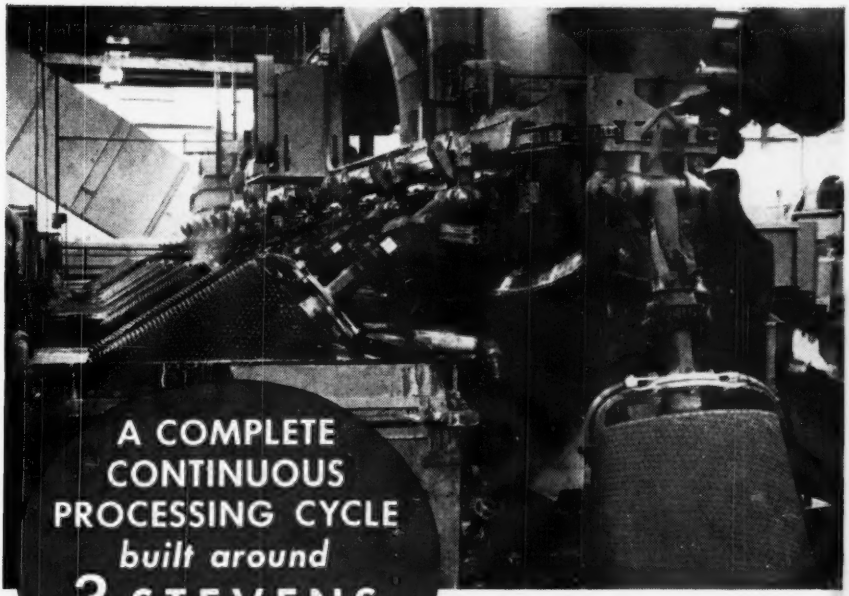
The Cut Bulk size is 18" x 36"—folded to 4½" x 18" for easy handling. *All of our Tack Cloth is Spontaneous Combustion-Proof, Lint-Free and Wax-Free.* It's clean and sanitary—*there's no waste.*

Write today for complete information, prices and samples.

BAUGHN CHEMICAL PRODUCTS CO.
The Tacky Wiper Specialists
7019 N. Ravenswood **Chicago 26, Ill.**

Also Individually Packed in Glassine Envelopes — 144 to the Carton

— A WARRANTY OF SATISFACTION IN EVERY CARTON —



A COMPLETE CONTINUOUS PROCESSING CYCLE *built around* 3 STEVENS *AUTOMATIC* PLATING MACHINES

Shakeproof, Inc., Elgin, Illinois, is realizing new operational economies with their Stevens Full Automatic installation for complete processing of small, stamped and cold headed fastening devices. The entire processing cycle is automatic and includes cleaning, plating, rinsing, bright dipping and drying. Two Stevens Full Automatics are used for zinc and cadmium plating while a third Stevens unit is used for phosphatizing parts requiring such treatment. According to Shakeproof, their Stevens continuous processing installation gives better control of plating thicknesses, fewer rejects, cleaner operation with reduced operating manpower requirements, and absolute minimum material handling costs because of its straight-flow operation.

You can bring these same benefits to *your* plating operations with Stevens equipment. Have your Stevens representative show you all of the advantages offered by Stevens Full Automatic Plating Machines. Or, write direct to *Frederic B. Stevens, Inc., Detroit 16, Michigan,* for full details.

METAL FINISHING EQUIPMENT AND SUPPLIES SINCE 1883

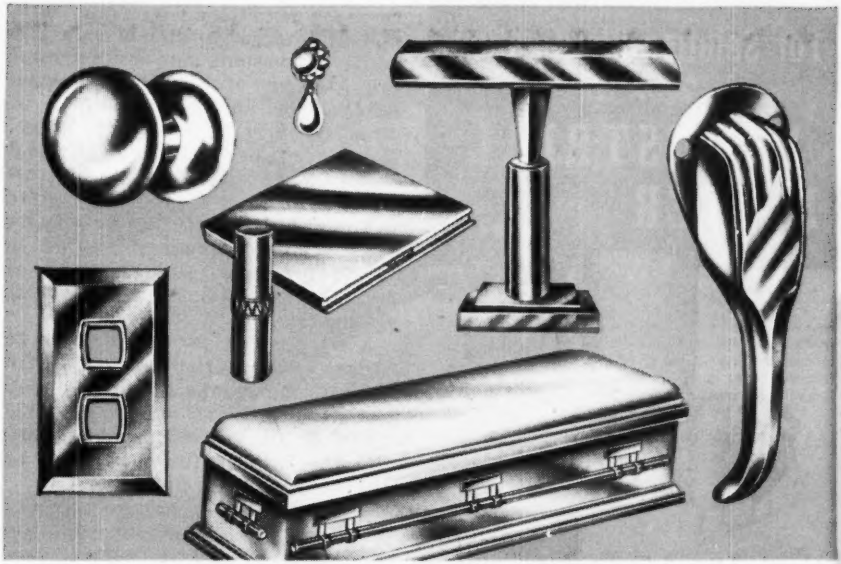
FREDERIC B. **STEVENS** INCORPORATED

DETROIT 16, MICHIGAN

TABLE III.

RESULTS OF EXPOSURE OF COPPER-RICH NON-FERROUS METAL SPECIMENS TO WARM HUMIDITY TEST.

Specimen		Condition after Exposure to Humidity Test for a period of:		
No.	Metal	1 day	1 week	7 weeks
1.	Beryllium Copper.	Unaffected.	Slight tarnishing.	No further deterioration.
2.	Copper.	Unaffected.	Slight tarnishing.	No further deterioration.
3.	Phosphor Bronze.	Unaffected.	Unaffected.	Slight tarnishing.
4.	Aluminum Bronze.	Unaffected.	Unaffected.	Unaffected.
5.	Brass (64%).	Unaffected.	Unaffected.	Slight tarnishing.
6.	Cupro-nickel.	Unaffected.	Slight tarnishing.	No further deterioration.
7.	Nickel Silver, 18%.	Unaffected.	Slight Yellowish tarnish.	— ditto —
8.	Nickel Silver, 12%	Unaffected.	Slight Yellowish-brown tarnish.	— ditto —



NOW...simulate copper, brass and bronze on products like these with M & W PLATELUSTRE

Don't let critical metals put a *needless* crimp in your production!

Take zinc or steel—apply a coating of one of the new PLATELUSTRE finishes. You wind up with products and parts that look so much like copper, brass and bronze that *the eye can scarcely tell the difference!*

Whether you have been using now unavailable copper and its alloys for *making* products or for *plating* products, you will find these new M & W finishes *equally* effective in keeping your plant running. There are types for air-drying and baking schedules—pick the one that best fits *your* production requirements.

Let an M & W Technical Service Engineer show you—*right in your own plant*—how easy these PLATELUSTRE coatings are to use, and what striking effects they produce. Or, if you prefer, write for free literature.

PIONEERS IN PROTECTION

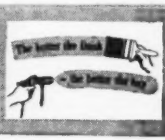
75th ANNIVERSARY • M&W CO. 1876

MAAS & WALDSTEIN CO. 438 RIVERSIDE AVE. NEWARK 4, N. J.

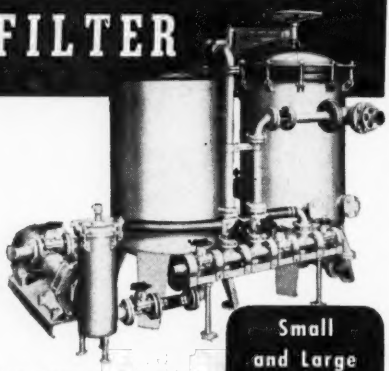
MID-WEST DIV. - 1658 CARROLL AVE., CHICAGO 12, ILLINOIS

PACIFIC COAST DIV. - SMITH-DAVIS CO., 10751 VENICE BLVD., LOS ANGELES 34, CAL.

MANUFACTURERS OF INDUSTRIAL FINISHES



For Solution Clarification
Use an
INDUSTRIAL
FILTER



The flow rate of an INDUSTRIAL filter is based on the actual solution involved. You know the capacity you get. Furthermore, the labor, down time, and the inconveniences of cleaning, replacing the filter media, and reassembling the filter for every filtering cycle—all are eliminated by the Industrial Air-Wash Cleaning Method available for all models. It is necessary to remove the cover only when new filter cloths are installed. With Industrial filters, a clarified solution is always assured.

The engineering, design, and construction of Industrial Filters have proved out in long service and low maintenance costs Industrial has the experience and is large enough to handle your filter requirements. Since 1927 filters and filtration systems have been an important part of our business.

★ ***Write for recommendations***

INDUSTRIAL FILTER & PUMP MFG. CO.

5904 Ogden Ave., Chicago 50, Illinois

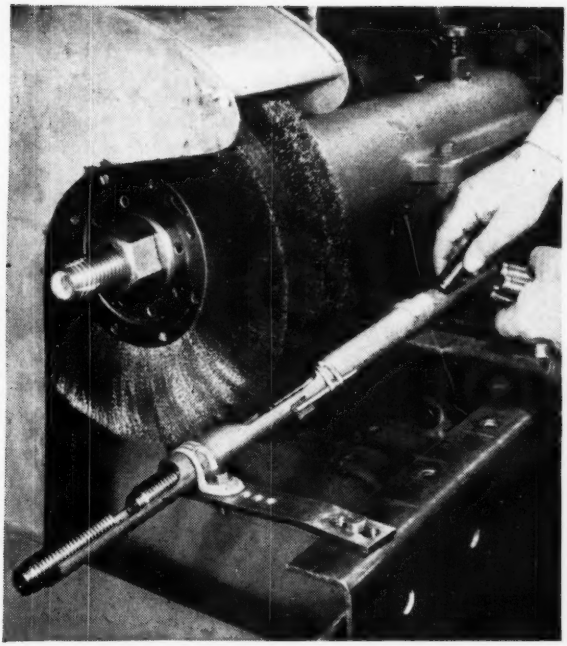
corrosive conditions a maximum of 0.5 volt, is a target to aim at as a good guide. Magnesium, zinc and aluminum are at one end of the scale, and copper, brass, nickel, silver and gold at the other. Often in design and assembly, it is impossible to avoid the use of metals from these opposite extremes together, but by choice of appropriate electroplatings the disparity can be reduced. Thus copper rich alloys may be tin plated for contact with aluminum alloys, or zinc or cadmium coated for use against zinc alloys.

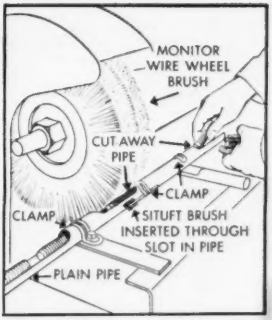
A third reason for plating is to facilitate soft soldering with non-corrosive resin fluxes; the copper rich alloys are difficult to solder when slightly tarnished in storage or during assembly periods. Electroplating with tin or silver eliminates this difficulty.

A fourth reason has an electrical basis. Low contact resistance or maintenance of low contact resistance may be an essential feature in the functioning of an apparatus. Plating with silver, gold, or silver plus rhodium can be chosen to solve this problem. Thousands of intricately designed tiny beryllium copper clips have been gold plated for this reason. Again, high frequency conductance may be involved, and silver or silver plus rhodium is employed for this purpose.

Surface Conditions and Heat Treatment

Beryllium-copper finds use for all types of springs, whether flat or formed, coiled or more complex in shape, and diaphragms, as well as for gears, bearings, connectors, and gages. All designs of apparatus, mechanically or electrically operating, can employ the material advantageously. The product is represented by clocks, meters and apparatus for telephone, telegraph, radio, automatic and remote control systems. In these industries, control of raw material quality is recognized as of first importance, and it is an essen-





THE FIXTURE. This sketch shows how to make pipe fixture for deburring and polishing small parts, threaded or smooth. Can be made of steel, fiber or plastic tubing.

How to find an 800% production increase in a piece of pipe

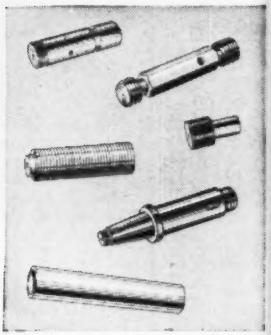
You can save manpower and money in countless ways when you tap the idea resources of power brushing. For example:

It took 18 seconds to clean the threads of the 2½ x ¼-inch set screws shown above. Time was cut to 2 seconds with Osborn Power Brushing by divising the simple pipe fixture shown. The operator feeds the screws in one end of the pipe and an Osborn brush makes contact with the work at a slot cut in the pipe, spinning and cleaning the threads uniformly. A little stationary wire brush, inserted as shown through the pipe, controls rotation and traverse of the work.

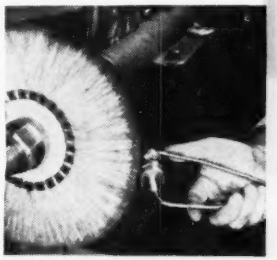
Have your **O**sborn **B**rushing **A**nalyst help you develop and apply output-increasing ideas to *your* cleaning and finishing operations. Call now or write *The Osborn Manufacturing Company, Dept. 568, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



TYPICAL PARTS. Set screws, pins, pieces of tubing and other parts such as these can be cleaned and finished in the pipe fixture or in the forceps shown below.



ANOTHER SIMPLE APPROACH. For small parts such as bushings, a simple forcep fixture can be devised to hold parts for power brushing. This one is made of wire.

TABLE IV.

RESULTS OF EXPOSURE OF COPPER-RICH NON-FERROUS METALS, HEAVILY FINGER-MARKED, TO WARM HUMIDITY TEST.

Specimen		Condition after Exposure to Humidity Test for a period of:		
No.	Metal	1 day	1 week	7 weeks
1.	Beryllium Copper.	Slight tarnishing.	Finger marks showing as a slight corrosion pattern on a tarnished background.	Corrosion pattern of finger marks on a tarnished background clearly revealed.
2.	Copper.	— ditto —	— ditto —	— ditto —
3.	Phosphor Bronze.	Unaffected.	— ditto —	— ditto —
4.	Aluminum Bronze.	Unaffected.	Unaffected.	Virtually unaffected.
5.	Brass (64%).	Unaffected.	Finger marks showing as corrosion patterns on a tarnished background.	Corrosion pattern of finger marks clearly revealed against tarnished background
6.	Cupro-nickel.	Unaffected.	— ditto —	— ditto —
7.	Nickel Silver, 18%.	Unaffected.	— ditto —	— ditto —
8.	Nickel Silver, 12%.	Unaffected.	— ditto —	— ditto —

NOPCO* 1067-A

...SAVES PICKLING ACID

...AIDS ANODIZING

...IMPROVES PHOSPHATIZING

In all of these important operations—pickling, anodizing, phosphatizing—the remarkable ability of Nopco 1067-A to reduce surface tension in mineral acid solutions leads to definite economies, improvements in processing, and better final products.

PICKLING—Addition of Nopco 1067-A to the pickling bath—

(a) reduces loss of acid solution through carry-over to the rinsing tank by 30% to 40%;

(b) reduces acid contamination in operations following pickling—helping to increase die life;

(c) effects faster and more uniform penetration of oxide scale—assuring clean, *smooth* metal surfaces after pickling.

In general, 0.1% of Nopco 1067-A on the weight of the acid solution gives outstanding results.

ANODIZING—Use of Nopco 1067-A in the anodizing bath not only affords high drain-off of the acid solution, but results in "taming" of the bubbles caused by air-blast agitation. Bubbles are reduced in size and they burst gently, minimizing spray. In some instances, need for costly lead-lined exhaust fans has been eliminated.

PHOSPHATIZING—Addition of 0.1% of Nopco 1067-A to "Bonderizing" chemicals lowers surface tension substantially. This results in exceptionally even spreading which promotes excellent over-all adherence of paint or enamel to ferrous metal.

Mail the attached coupon today. We'll send you promptly full information about Nopco 1067-A —the unique wetting agent which not only assures improved products but saves money, time, and labor in all types of acid treatments.

*Reg. U. S. Pat. Off.

NOPCO TRADEMARK EVOLVED THRU RESEARCH

NOPCO CHEMICAL COMPANY
Harrison, N. J.

BRANCHES: Boston • Chicago
Cedartown, Ga. • Richmond, Calif.

Nopco Chemical Company
Harrison, New Jersey

Gentlemen:
Please send me full information about Nopco 1067-A

Name .....

Firm .....

Address .....

City ..... Zone ..... State .....

tial for rendering the electroplating processes free from troubles. Surface condition must be correct and damage in heat treatment avoided. Where no severe bending or forming is entailed in the fabrication of the part, the material can be purchased in the work-hardened condition, so no heat-treatment is involved, and the initial problem reduces itself to surface condition only.

The surface condition of material as received must be good. It may range from somewhat dull to bright, but should be uniform over the whole surface and free from rolling marks, scratches and pits or cavities, free from rolled-in scale and black inclusions. Any defects will be exaggerated by pickling and plating pretreatments, and prevent smooth uniform plate coatings from being obtained.

Material that is destined for hardening after fabrication must be checked for ability to harden. This is partly dependent upon beryllium content being above a minimum value of 1.90 per cent, and partly upon the material being fully in the "solution treated" condition. If the latter is not the case, an additional treatment consisting of quenching from 800 deg. C. has to be applied, which adds to the cleaning required in processing and the possibility of spoilage. This high temperature treatment should only be applied when essential for softening at intermediate stages of fabrication of the component. The correct condition of deliveries is easily checked at the time of receipt by submitting small samples to the hardening process (quenching from 300/320 deg. C.), and checking the response of the material by hardness testing.

Pickling Processes

The first pickling processes required are after heat-treatment processes. The oxide film that forms during the

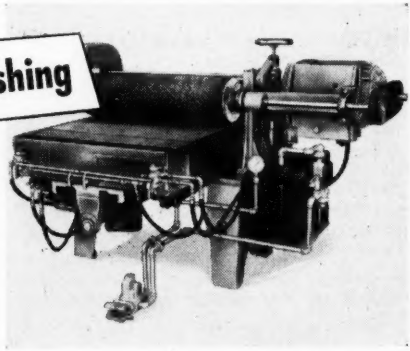
Precision

for improved surface finishing

CLAIR

SURFACE FINISHING MACHINES

With adjustable, abrasion-proof hydraulic controls permitting rapid change of variables, these machines assure quality surface finishing on a production basis. With magnetic or vacuum chuck, Clair Machines are custom-built to solve your surface finishing problem.



CLAIR

MANUFACTURING CO., INC.

Specialized Machine Equipment For Glazing and Polishing Operations

OLEAN, N. Y.

For efficiency in surface finishing products like these:

Screw Drivers
Chisels • Pliers
Saws • Wrenches
Compacts • Fan Blades
Cigarette Cases
Fine Silver
Surgical Instruments
Flat Iron Sole Plates

This is an ENTIRELY NEW AIR DRYING PRIMER TO MEET TODAY'S PROBLEMS

With Brass and Copper in rapidly decreasing supply —

With Hot Galvanizing hard to get —

With resulting immediate problems of Corrosion and Rust due to the substitution of ferrous metals —

INVESTIGATE this New Timely Answer to many Industrial Finishing problems.

TOTRUST INSTANT DRY
RUST INHIBITIVE PRIMER

1. Dries under normal conditions in 10 to 30 minutes for recoating with TOTRUST, any standard oil or rubber based paint or spraying lacquer.
2. Primes rusted or clean, damp or dry, painted or unpainted metal, galvanized surfaces or aluminum.
3. Is easily applied by brush or spray.
4. Withstands Welding flux. Saves HOURS . . . Saves DOLLARS.

Are today's restrictions and non-ferrous scarcities compelling you to adopt new ways to apply industrial finishes? TOTRUST INSTANT DRY PRIMER provides fast, sure, tough protection for thousands of situations where danger of corrosion is an active factor.

The WILBUR & WILLIAMS CO., for over 20 years have been specialists in protective coatings for Industry, pioneers in penetrating rust inhibitives, FIRST in Full Rubber based paints and leaders in Vinyl coatings.

Write today for free test samples of TOTRUST INSTANT DRY PRIMER and for full information on this and other specialized coatings to meet your particular finishing needs. Your inquiry will receive the careful attention of specialists in corrosion and rust protection.

THE WILBUR & WILLIAMS CO.

Please send me without obligation sample of TOTRUST INSTANT DRY RUST INHIBITIVE PRIMER for test use on:

.....

.....

and advise me the name and address of my nearest source from which this can be purchased.

Name .....

Company .....

Address .....

City ..... Zone..... State.....

TABLE V.

POTENTIALS AGAINST NORMAL COLOMEL CELL IN ARTIFICIAL SEA WATER AT 25 DEG. C.

Metal	Potential in Volts.
Magnesium and its Alloys.	— 1.60
Zinc and its Alloys.	— 1.05 to 1.10
Zinc Plating on Steel.	
Galvanizing on Steel.	
Tin/Zinc Alloy (80/20) plating on steel.	
Cadmium.	— 0.75 to 0.80
Cadmium plating on steel.	
Aluminum 7% magnesium alloy.	— 0.80
Aluminum 10% silicon alloy.	— 0.80
Aluminum.	— 0.75
Duralumin.	— 0.62
Tin.	— 0.62
Lead.	— 0.61
Mild Steel.	— 0.58
Steel 1% Carbon.	— 0.50
Tin/Lead Solders.	— 0.50
Pure Iron.	— 0.46
Steel, medium carbon.	— 0.42
Stainless Steel, 18/8.	— 0.33
Brass.	— 0.22 to 0.28
Copper.	
Aluminum Bronze.	
Nickel.	
Nickel Silver.	
Monel Metal.	
Cupro-Nickel.	
Phosphor Bronze.	
Beryllium Copper.	— 0.20
Silver.	+ 0.02
Gold.	+ 0.06
Platinum and Rhodium.	+ 0.10

PHOSPHATE COATING CHEMICALS FOR SPECIFICATION FINISHES

METAL	GOVERNMENT SPECIFICATION	ACP SPECIFICATION CHEMICAL
STEEL	JAN-C-490, Grade I U.S.A. 57-0-2, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C	"GRANODINE"
	U.S.A. 57-0-2, Type II, Class B U.S.A. 51-70-1, Finish 22.02, Class B	"PERMADINE"
	U.S.A. 57-0-2, Type II, Class A U.S.A. 51-70-1, Finish 22.02, Class A	"THERMOIL-GRANODINE"
ALUMINUM	MIL-C-5541 MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16E4 (Ships)	"ALODINE"
ZINC	QQ-P-416 RR-C-82 JAN-F-495 AN-F-20 U.S.N. Appendix 6	"LITHOFORM"

"GRANODINE"®

"GRANODINE" forms a zinc phosphate coating on steel and zinc surfaces. This non-metallic bond holds and protects the paint finish and thus preserves the metal underneath.

"LITHOFORM"®

"LITHOFORM" makes paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE"®

"ALODINE", the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal painted or unpainted.

"PERMADINE"®

"PERMADINE" forms an oil-adsorptive zinc phosphate coating on steel, which, when treated with rust inhibiting oil, is highly corrosion resistant.

"THERMOIL-GRANODINE"®

"THERMOIL-GRANODINE" forms a manganese-iron phosphate coating on steel, which, when oiled, provides wear-resistance for rubbing parts — and, when oiled or painted, inhibits corrosion.

Write for Information and Descriptive Folders

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of METALLURGICAL, AGRICULTURAL and PHARMACEUTICAL CHEMICALS

TABLE VI.

EFFECT OF ACID IMMERSION UPON BERYLLIUM COPPER AT ROOM TEMPERATURE SHOWN BY WEIGHT LOSSES.

	Loss in Weight. mg./sq. in.	
	Immersion Period.	
	6 hours	24 hours
10% by vol. Sulfuric Acid.	Negligible	2
5% by vol. Sulfuric Acid, plus 3% Potassium Dichromate.	320	1200

latter can be very tenacious, due to the beryllium constituent. Indiscriminate and vigorous acid treatment is ill-advised, because the film is attacked at differing rates in various areas, and much pitting results.

This may mean the production of points of mechanical strength lower than the average for the material, and, in the case of springs therefore, premature failure in service. On electrical components, it may lead to poor contact, "noisy" contact, reduced wear resistance, and the possibility of impoverished performance at high frequencies. At this juncture, it is not out of place to stress that every care is warranted during heat treatments to ensure the minimum of oxidation. Controlled atmosphere heat treatment is, therefore, advocated, and if hydrogen or nitrogen atmospheres cannot be assured, then salt bath methods of heating are advocated. In fact, this last type of furnace equipment is recommended always for this class of work.

The usual method of pickling for this class of work uses sulfuric acid containing an oxidizing agent such as potassium dichromate or ferric sulfate. This is rapid in action in removing the scale and oxide film, but also attacks the base metal due to the presence of the oxidizing agent. Loss of dimensions results, and this may be serious in very thin springs; also the surface unevenness created by irregular oxidization may become accentuated. A preliminary treatment in dilute sulfuric acid alone is therefore advised because, although slower, this exercises no solvent action on the base metal. This is clearly illustrated by the laboratory data given in Table VI. The following procedure is therefore recommended for work immediately or shortly after heat treatment, and before any subsequent forming or press operations which may drag the scale into the surface of the material.

(a) To remove the light scale formed in hardening operations from non-controlled atmosphere furnaces, or the hardening or annealing film from salt bath furnaces:

Pickle by immersion in 10 per cent by volume sulfuric acid solution. Operated at 90/100 deg. C., a few seconds is required for normal films, and less than 1 minute for heavier scales.

Lower temperatures are quite

RHODIUM
PLATING
Rhodium, a hard brilliantly white, tarnish-proof precious metal, is the logical answer to the restrictions on the usual plating metals for such objects as optical mounts, contacts for communication equipment, radar components, surgical instruments, and pen and pencil sets. Many others will occur to the mind of the practical plater.
Commercial rhodium plating was developed in our laboratories, and Baker Rhodium Plating Solution is made under the direction of the men who developed the process.
Let us send you *Directions for Rhodium Plating.*
Baker & Co., Inc.
113 ASTOR ST., NEWARK 5, N. J.
New York • San Francisco • Chicago

satisfactory but longer times must be allowed; for example, up to 2 minutes at 50 deg. C., and up to 20 minutes at room temperature. Stronger acid solutions do not increase the rate of cleaning at room temperature although they do at elevated temperatures. Thus 25 to 30 per cent acid at 90/100 deg. C. only needs a few seconds immersion for the worst cases. Stronger acid than this should not be employed.

The conditions can be chosen to suit the work and the quantity of work; in most cases the treatment time for dilute acid at room temperature can be tolerated. Over-immersion can cause no harm as no attack on the metal itself occurs.

(b) To remove the heavy scale formed in annealing operations from non-controlled atmosphere furnaces:

The hot dilute sulfuric acid solution is deemed to be essential for a reasonable immersion time. This may range from a few seconds to a few minutes at 90/100 deg. C., or rather longer at 50 deg. C. Room temperature immersion is too slow.

It is to be noted that the scale from annealing at 800 deg. C. is naturally more difficult to remove than that from hardening at 300/320 deg. C. If tanks are not available to withstand hot acid, it is a comparatively simple matter to install a coil-heated water tank in which can be stood a chemical stoneware tank containing the acid solution. This avoids the plant complications of using lead-lined tanks.

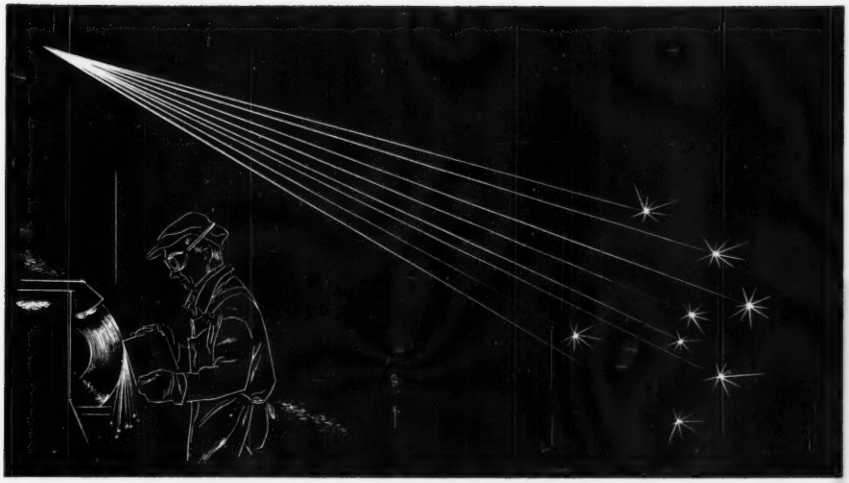
It should be ensured that all traces of black film are removed in this treatment. Water washing naturally must follow. The surface condition of the work so treated will be variable dependent upon condition before pickling. The worst condition will be that from black scaled work, and this will be patchy and dull, with irregular coppery stains. This may be good enough for subsequent press operations but not good enough as a final finish. Consequently, such work (and generally all work is processed thus) is rendered more uniform, neater and brighter, by the following process:

Immerse at room temperature in dilute sulfuric acid solution containing oxidizing agent for the minimum of time.

A solution containing 5 per cent by volume of sulfuric acid and 2 to 3 per cent by weight of potassium or sodium bichromate is the best solution. From 1 to 2 minutes immersion period should be adequate. The time is kept to the minimum required to develop the uniform appearance, because of dissolution of the base metal itself.

Ferric sulfate may replace the dichromate but is rather more expensive; it is useful as an al-

NALCO
Infra-Red UNITS
Speed Industrial Drying, Baking and Heating
Engineered for production use, Nalco Infra-Red Lamps with long-lasting carbon filaments give less glare, more penetrating heat . . . assure completed jobs at a faster rate—and at a much lower cost
From single units, strips and portable units to banks and ovens, Nalco Infra-Red Lamps and units can be "tailored" to speed up your production.
Write for "Drying Problems Made Easy"
NALCO
INFRA-RED DRITHERM
NORTH AMERICAN
Electric Lamp Co.
1020 TYLER ST.
ST. LOUIS 6, MO.



Can you tell this steel* by its sparks?

It takes a grinding *expert* to do it. (Sparks coming from *low-carbon chromium steel.)—But it doesn't take an expert to be sure of one thing: the more sparks you see, the more certain you can be that a 3M Abrasive Belt is doing the job.

They cut faster — last longer, too. And they resist loading, give a smoother finish at lower cost than ordinary abrasives.

Comparison tests prove it. Our experts are ready to work with you on your grinding or finishing problems. They'll be glad to show you how greater savings can be initiated with the 3M Method. Use the coupon below for immediate attention.

Minnesota Mining & Mfg. Co., Dept. PF -1151
St. Paul 6, Minnesota

Please have 3M Methods Engineer call.

Name .....

Firm .....

Address .....

City ..... Zone ..... State .....

3M ABRASIVE BELTS

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives.
General Export: Minnesota Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y.
In Canada: Minnesota Mining & Mfg. Co. of Canada, Ltd., London, Canada.

ternative in these days of material shortages.

Cold and hot water washing, and then drying by centrifuge or oven should follow.

It should be mentioned that, if the work has become contaminated with oil or grease after leaving the heat treatment furnaces, it must be degreased before the acid pickling operations. This can most economically be carried out by cleaning in a mild aqueous alkali followed by water washing. Most alkalies are suitable, and, as a guide, a 5 per cent solution of equal weights of soda ash and sodium metasilicate, operated short of boiling, may be cited.

Pretreatment for Plating

Work received in the plating shop needs different acid cleaning. The articles may be fabricated by machine and press operations without any heat-treatment, or they may have had a final hardening operation. The first rule to be observed is that all black heat-treatment scale must have been removed by acid processing as stated before passing to the plating line. The second fact to be noted is that electroplate coatings will not adhere satisfactorily to the chromate pickled surfaces; this follows the generally known observation that, for example, traces of chromium plating solution in washwaters will prevent the adhesion of nickel coatings. The difficulty is overcome by a conventional "bright-acid dip" having a nitro-sulfuric acid basis. The plating shop preparatory treatments may thus be along the following lines:

1. Remove the bulk of oil contamination by solvent or vapor degreasing.
2. Clean in mild alkali, for example, ½ to 1 lb. per gallon of a mixture of 3 parts soda ash, 3 parts sodium metasilicate and 1 part trisodium phosphate, operated at 90 deg. C., followed by thorough water washing.
3. Brighten in a nitro-sulfuric acid dip. A satisfactory procedure comprises a quick immersion in a mixture of 3 parts nitric acid and 1 part sulfuric acid, cold water rinse, then a quick dip in a mixture of 1 part of nitric acid and 3 parts of sulfuric acid. This is followed by thorough water washing.
4. Without allowing the work to dry off, it is rinsed in cold 5 per cent sodium cyanide solution or in 5 per cent (by volume) sulfuric acid solution, according to whether it is to be next introduced into an alkaline or acid electrolyte. Thorough rinsing in cold water precedes introduction into the plating vat or barrel.

The conventional plating processes are applicable and can be applied in the normal manner, and the following makes some suggestions for meeting specific requirements.

Appearance

Tin deposited from modern electrolytes (alkaline stannate or sulfate stannous solutions) gives a neat white appearance which is retained under mildly corrosive conditions, and gives sacrificial protection in severaly adverse environments. Such tin coatings also present good surfaces for soldering with resin cored solder, and it is one of the most useful platings for leveling differences of potential at bimetallic junctions.

CHEMSTEEL CONSTRUCTION COMPANY, INC.
301 Chemsteel Bldg., Walnut St., Pittsburgh 32, Pa.
Send data on Engineering & Construction facilities for
ACID-ALKALI-PROOF CONSTRUCTION
of processing & storage tanks & flooring in
☐ Steel Plant ☐ Chemical ☐ Textile ☐ Food
NAME.....
COMPANY.....
ADDRESS.....
CITY..... ZONE ..... STATE ....

Oh...WHAT A LINE!

- BUFFING NU SPRA GLU
  LIQUID BUFFING COMPOUND
- BRUSHING NUGLU
  GRAIN AND NUGLU
- NUGLU
  COLD FLEXIBLE GLUE

BUY IT— TRY IT—

Immediately, you will discover why *SIEFEN* leads the Field in Metal Finishes.

J. J. Siefen CO.

8645 LAUNDALE • DETROIT 9, MICH.

Nickel plating is quite widely used to give a white finish but it is only really satisfactory under mild conditions, when it may acquire a slight yellowish tinge due to a passive oxide film. The passivity breaks down under more severe conditions, especially if the air contains appreciable quanties of sulfuric or saline impurities.

Electrical Contact

Silver plating is satisfactory if the operating conditions are such that the sulfide tarnish film which inevitably forms can be broken through at the voltage used. The film is not of high resistance, and is only likely to cause trouble in light duty (infrequently used) circuits operated at very low currents and voltages. In other cases, the silver should be finished with a protective film of petroleum jelly by dipping in a 1 to 2 per cent solution of jelly in white spirit. This type of finish is readily solderable.

For a more permanent conductive surface, the silver can be flashed with rhodium. Alternatively, gold plating may be selected, thin coatings being very successful; from 0.00005 to 0.0002 inch represents the usual range used.

High Frequency Conductance

Silver plating is the logical choice, to a thickness of the order of 0.3 mil minimum. It is usual to apply the petroleum jelly solution treatment to safeguard against sulfide tarnish, or a flash of rhodium for protection against more serious corrodants.

Contact Potential

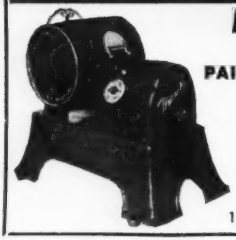
For levelling differences of contact potential, tin can usually be accommodated, and should be chosen wherever practicable. Zinc or cadmium may be necessary upon some occasions, but they are not favored as they tend to diffuse rapidly into the base metal and to corrode away quickly under humid conditions. Finishes with either of these two metals are much improved by first depositing 0.1 mil of tin, and making the zinc or cadmium thickness a minimum of 0.3 mil. Cadmium is solderable when using non-corrosive resin flux, whereas zinc cannot be satisfactorily soldered under such conditions.

Soldering

Tin and silver are both excellent deposits for soldering with resin cored solder. So also is the "corronized" coating of nickel followed by tin, heat treated for 30 minutes at 200 deg. C. The nickel coating may be of the order of 0.00015 to 0.0002 inch, and the tin 0.0001 to 0.00015 inch. This combination finish retains its solderability after long storage. Cadmium and gold can also be soldered, so that in order to meet a combination of requirements from the above criteria, little difficulty should be encountered.

The availability of beryllium-copper has enabled advances to be made with respect to the size and performance of instruments and electrical communications apparatus. These branches of engineering have become of even greater importance today. The notes in the foregoing reveal how the electroplater has kept pace with advances in materials and components, the extent to which the problem of beryllium-copper is appreciated, and the fact that the engineer can have any electroplate coating that may be necessary.

PAINT MIXER



MIRACLE
5 GALLON
PAINT REJUVENATOR
All paint restored to original consistency without opening the can.
2 minutes per gallon.
MIRACLE PAINT REJUVENATOR CO.
128 E. 10th St., St. Paul 1

Unichrome CLEAR Enamels

add durability to a BRIGHT finish like this

This piece of brilliant door hardware was zinc plated and then made bright as chromium by treatment in Unichrome Dip. This was followed up by application of a really tough, clear enamel — Unichrome Coating B-115 — to provide outstanding resistance to corrosion, handling and exposure.

This same, service-proved, non-yellowing baking synthetic is also ideal for use on chromium which has been deposited over thin nickel or no nickel at all. Here, too, you'll get the extra protection and adhesion needed for a dependable, durably bright finish.

Also available are durable, *light-fast* Unichrome Coatings to simulate gold, brass or copper colors on polished stainless steels and chromium.

Need help on a combination finish for your product? Write the Company that knows *metal* finishes as well as their requirements in *coatings* — United Chromium.

UNICHROME

COATINGS for METALS

METALLIC • ORGANIC • PROTECTIVE • DECORATIVE

Products of UNITED CHROMIUM, INCORPORATED, 100 E. 42nd St., New York 17, N. Y.

Waterbury 20, Conn. • Detroit 20, Mich. • Chicago 4, Ill. • Los Angeles 13, Cal.

In Canada: United Chromium Limited, Toronto, Ont.

Try this ONE-COAT, Two-Purpose, Three-Dimension Finish for those Hard-To-Dress-Up Products . . .

the New DIMENSO® ONE-COAT METALLIC

Here's a rich, lustrous answer, in a single package, to a wide range of finishing problems! Dimenso One-Coat provides a dual-purpose, finish that goes on in a *single* coat without need for special spray equipment.

It gives beautiful, varied, hammered effects for large, uninteresting surfaces—or, by modifying the method of application, a variety of rich opalescent effects. It can cut metal-finishing costs in many cases by eliminating priming operations . . . covers minor metal surface defects in one coat without expensive surface preparations.

Dimenso One-Coat air-dries out of dust in ten minutes. It *bakes* in 3 to 5 minutes at 350° F. It provides a *tough, mar-resisting* film that withstands severe service, with excellent *heat resistance*. For complete details, ask your Sherwin-Williams Branch for Bulletin D-506 . . . or write to The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio.

TWO FINISHES IN A SINGLE CAN Sprayed on smooth metal, Dimenso One-Coat gives a unique hammer pattern. When surfaces are not completely smooth, apply a full wet coat, followed by a light mist coat, and you get a rich, opalescent effect.

NEEDS NO SPECIAL EQUIPMENT—Dimenso One-Coat is applied with regular spray equipment and no special skill is needed.

HIDES SURFACE DEFECTS WITH ONE COAT—Slight imperfections in metal surfaces are completely hidden by a single coat of this new S-W Brown Label Finish.

SHERWIN-WILLIAMS
INDUSTRIAL FINISHES

Another Product of Sherwin-Williams Industrial Research — Cover the Earth

CIVILIAN PRODUCTION

DEFENSE ORDERS

SHERWIN-WILLIAMS

INDUSTRIAL FINISHES

KEMCLAD

•

SUPERCLAD

•

KEMVAR

•

TV LACQUERS

•

HEETCLAD

•

KEMWOOD PRODUCTS

•

DIMENSO

the same dependable source for

• FINISHING MATERIALS

• FINISHING KNOW-HOW

Whether you are buying finishes to meet defense specifications or your own civilian requirements, you can simplify the job . . . find dependable help on special needs . . . eliminate troublesome problems . . . through The Sherwin-Williams Industrial Division with its wealth of know-how and background, both in civilian and wartime experience.

This broad background provides the same extra advantage of experience in Sherwin-Williams finishes supplied to meet military specifications—whether for wood, metal or other surfaces—as in the S-W finishes well known for many years for civilian production, such as Kemclad, Superclad, Kemvar and TV Lacquers. This experience is available wherever you may be, through facilities extending from coast to coast. Call, wire or write The Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland 1, Ohio.

SHERWIN-WILLIAMS

INDUSTRIAL FINISHES

Cleaning With Sound Waves

By JOHN STARR

ULTRASONIC cleaning is, briefly, a method of propagating high-frequency sound waves in solvents or related solutions so that numerous types of industrial materials or parts can be degreased, descaled, and so forth, with unprecedented speed and effectiveness.

The usefulness of ultrasonic energy in this connection is attributable to resonance, a property which greatly increases the wetting action of a solution when vibrations of a suitable frequency and intensity are propagated therein.

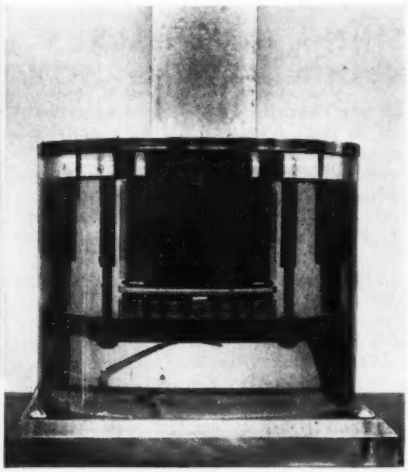


Fig. 1—Closeup view of the piezoelectric crystal housing for an electrostrictive transducer used in generating ultrasonic energy for small-scale production purposes. The vibrating crystal is situated in the base of the housing unit, submerged in a coolant to prevent damage due to ultrasonic heating effects. A glass column (upper center) serves as part of a condenser unit to return vaporized particles to the contents of the cleaning solution container.

All types of ultrasonic generators or transducers can theoretically be used for cleaning purposes, but experience to date indicates that only three of these are commercially practical.

Most versatile of the latter are electrostrictive generators, which involve the use of radio-frequency energy to produce vibrations as high-speed dimensional variations (expansions and contractions) in quartz and other types of piezoelectric crystals. Electrostrictive generators (Fig. 1) can create vibrations with virtually all ultrasonic frequencies where crystals with suitable resonance values are employed, but they have, heretofore, been limited to small-scale applications due to the physical inadequacies of natural piezoelectric crystals. These inadequacies are now apparently being eliminated for many practical purposes through the use of synthetic piezoelectric crystals which are made by electrically charging fired-ceramic materials at the Brush Development Company of Cleveland, Ohio.

Magnetostrictive generators are analogous to electrostrictive generators since they involve the use of an oscillating electromagnetic field to produce vibrations as dimensional variations in ferromagnetic transducer elements. These generators have been preferred for many ultrasonic applications in the

past (for example, in the sonar or submarine-detection devices used during World War II) because their vibrational output may be extremely intense. However, magnetostrictive generators are limited to ultrasonic output frequencies of less than 100,000 cycles for most practical purposes—whereas electrostrictive generators may produce usable ultrasonic vibrations at frequencies ranging from about 18,000 to more than 5,000,000 cycles.

Friction generators, wherein glass rods are ultrasonically vibrated as the result of electrostatic reactions (caused by mechanically rubbing the rods with materials such as silk), have been successfully used for small-scale laboratory cleaning operations. However, they are not yet available as commercial products.

Manufacturers of electrostrictive generators which are suitable for different ultrasonic cleaning purposes now include the aforementioned Brush Development Company; General Electric Company at Schenectady, N. Y.; and Fisher Scientific Company of Pittsburgh, Pa. Magnetostrictive generators for ultrasonic cleaning applications have been developed by General Sound Company at Burbank, Calif., and Massa Laboratories of Cleveland, Ohio.

Fig. 2—A magnetostrictive transducer developeed by West Coast Enterprises, Los Angeles, California.

JOHN STARR, after graduating from the California Institute of Technology in 1936, launched his career with the Lockheed Aircraft Corporation in Burbank, California. He joined the Ford Motor Company's Long Beach plant in 1939 and remained there until 1942 when he became a Lieutenant in the U. S. Navy.

In 1946, Mr. Starr joined Research Associates of California as a process engineer. There, he has devoted his time to the development of specialized finishing techniques for manufacturers.

Cleaning Solutions

Solutions for ultrasonic cleaning operations are selected on the basis of pH values, solvent properties, and so forth, much the same as solutions used in conventional industrial cleaning operations. However, the following factors merit special consideration in certain circumstances:

1. The resonance properties of the solutions and the materials to be processed Typical properties in

ULTRASONIC PROPERTIES OF MATERIALS

Properties	Air	Alcohol	Bakelite	Glass	Steel	Oil	Water
Velocity, cm./sec. x 10^{+5}	0.331	1.44	2.59	4.9	5.81	1.39	1.43
Density, gm./cu.cm.	0.00120	0.79	1.4	2.5	7.8	0.92	1.00
Wavelengths at 1 mc. frequency	0.0344	—	0.259	0.520	0.581	0.139	0.290
Wavelengths at 5 mc. frequency	0.00688	—	0.0518	0.104	0.116	0.0278	0.0290

this category are shown in an accompanying table, and should be considered in order to determine the effectiveness with which ultrasonic energy can be used without damage to the materials being cleaned. As a rule, ultrasonic energy can be used with optimum efficiency at high output frequencies; but, simultaneously, high-frequency vibrations may be quite destructive. For example, sound waves with frequencies of less than 50,000 cycles can be effectively dispersed in soapy water; yet the water thus agitated can completely disintegrate some types of fabrics in a few seconds.

2. Thermal characteristics of the solution. Sound waves at high frequencies (more than 100,000 cycles) are characterized by intense heating effects, and may produce toxic vapors or become a fire hazard if used without certain precautions.

Cleaning Tanks

Conventional cleaning tanks, equipped with magnetostrictive transducers as indicated in Fig. 2 have been used for ultrasonic processing purposes. However, special tanks with rock wool or equivalent acoustical insulators should be used whenever higher-frequency sound energy is used to agitate

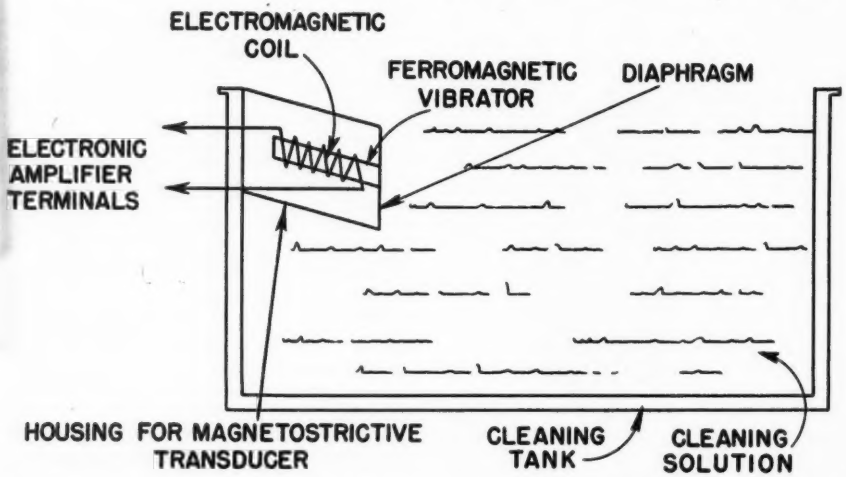
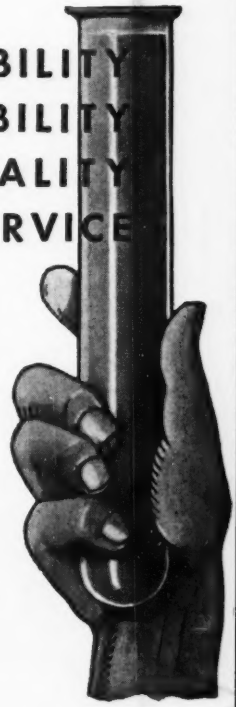


Fig. 3—Schematic diagram—side view of magnetostrictive transducer submerged in conventional cleaning solution tank for ultrasonic agitational purposes.

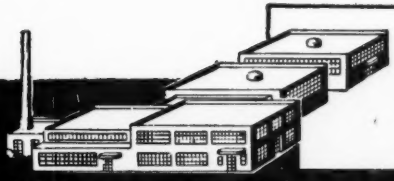
Inside the formula of every **RANDOLPH FINISH . . . .**

Randolph Finishes—developed over 18 years of intensive research and experience—are playing a mighty part in today's production drive. Producers of both defense and civilian goods are coming to Randolph for coatings that serve their products best. Dress up your product, give it its staunchest surface and new sales vigor with a Randolph Finish!

DEPENDABILITY
SUITABILITY
QUALITY
SERVICE



Every Randolph salesman is a technician—thoroughly experienced in his field. Discuss your finishing problems with him freely. Call on Randolph's technical resources for more dependable and economical production.



RANDOLPH
PRODUCTS COMPANY
CARLSTADT, NEW JERSEY

DOPES · LACQUERS · ENAMELS · THINNERS

cleaning solutions—not only for the sake of efficiency, but to assure the safety of operating personnel.

The dimensions of tanks or containers now used for ultrasonic cleaning are relatively small, and in some circumstances retain less than a gallon of cleaning solution. This is due to the design limitations of currently available sound generators which lack the output intensities required to propagate energy impulses through large areas. However, small containers do not necessarily constitute a handicap in production work.

For example, one of General Electric's most successful and economical cleaning units was designed to degrease an optimum load of 100 cubic inches of metallic materials or parts such as ball pen points, screw machine products, and electric razor heads. This unit is regarded as highly efficient because it can completely degrease a full load (comprising 10 to 50 parts) in only 60 seconds—a level of productivity that probably could not be attained in a 30-gallon cleaning tank without ultrasonic agitation.

Fig. 5—A friction generator, comprising a silk-lined pulley in contact with a glass rod, converts electrostatic energy into ultrasonics for laboratory operations. The glass rod is mounted at an angle to facilitate the dispersion of vibration in a solution-filled beaker.

Fig. 4—Experimental units of the type shown here have been developed by General Electric Company to facilitate the use of ultrasonics in laboratory tests designed to solve current industrial cleaning problems.

Technically speaking, there is no dimensional limit to the capacity of an ultrasonic cleaning unit; but, economically speaking, it is very unlikely that extremely large units of this type will be available for general industrial use in the immediate future because the cost of constructing such units in small quantities will probably be quite high.

BIBLIOGRAPHY

Wood: ACOUSTICS, published by Interscience, New York, 1947.

Morse: VIBRATION AND SOUND, published by McGraw-Hill, New York, 1948.

Den Hartog: MECHANICAL VIBRATIONS, published by McGraw-Hill, New York, 1947.

Bergmann: ULTRASONICS, published as English translation by J. Wiley & Sons, New York, 1948.

HOT SPRAY Successful in Many Industries!

Over 2,000 BEDE PAINT HEATERS ...in Use Today!

A Few Industries Using Bede Heaters

Automotive — Cabinets (metal, wood, television, radio) — Containers — Electrical — Farm and Road Machinery—Furniture (metal, wood) — Hardware — Household Appliances — Lighting Fixtures — Machine Tools — Motors, transformers—Musical Instruments — Office Appliances — Refrigerators — Show Cases — Doors and Partitions — Toys — Ventilating and Heating Equipment — Washing Machines — Military Installations.

Many leading manufacturers from coast-to-coast are now using the Hot Spray Process and Bede Paint Heaters in their finishing operations.

With Bede Paint Heaters quality of finish is greatly improved — fewer coats are needed — waste and overspray are reduced — time, labor and materials are saved — finishing room production is increased.

Consider the many benefits of using the Hot Spray Process and Bede Paint Heaters in your own finishing operations. Results in hundreds of plants have been excellent — in some cases phenomenal. Investigate for yourself. Write us today for Booklet listing users of Bede Heaters in many parts of the country.

WRITE OR WIRE FOR ILLUSTRATED BULLETINS

BEDE PRODUCTS Inc.

INDUSTRIAL FINISHING SPECIALTIES

4317-A RIDGE ROAD • CLEVELAND 9, OHIO

IMMUNOL

PREVENTS PLATING STAINS. PRESERVES BRIGHT FINISHES

Used in long dilution with water as your final rinse, IMMUNOL easily eliminates your staining problems and at the same time preserves bright plated finishes. No manual hand polishing or special cleaning operations are necessary and the use of IMMUNOL involves nothing more complicated than the addition of a small quantity to your rinse water.

An added advantage of IMMUNOL is that it also immunizes water against rust. This means your rinse tanks are protected by the IMMUNOL solution as well as the plated parts. Where it has been necessary to repeatedly paint or lacquer the inside of rinse tanks, the use of IMMUNOL eliminates these problems.

For the complete story of IMMUNOL and its many applications to cleaning, rustproofing and wetting out problems, send for our booklet.

Haas MILLER Corp.
4th & BRISTOL STS. • PHILA. 40, PA.

Carlin: ULTRASONICS, published by McGraw-Hill, New York, 1949.

Solner: "Dispersion of Solids in Liquids by Supersonic Waves;" Faraday Soc. Trans., 34:1170-1174, Sept., 1938.

Yeager & others: "Application of Ultrasonic Waves to The Study of Electrolytic Solutions, etc.;" Journal Chem. Phys., 17:411-415, 1949.

Harvey: "Sonoluminescence and Sonic Chemiluminescence;" Am. Chem. Soc. Journal, 61:2392-2398, Sept. 1939.

Parshad: "Supersonic Waves in Water-Alcohol-Sodium Chloride Mixture and Analysis of Its Intermolecular Action;" Acous. Soc. of Am. Journal, 21:175-6, May, 1949.

Mason & others: "Mechanical Properties of Long-Chain Molecule Liquids at Ultrasonic Frequencies;" Phys. Review, 73:1074-91, May 1, 1948.

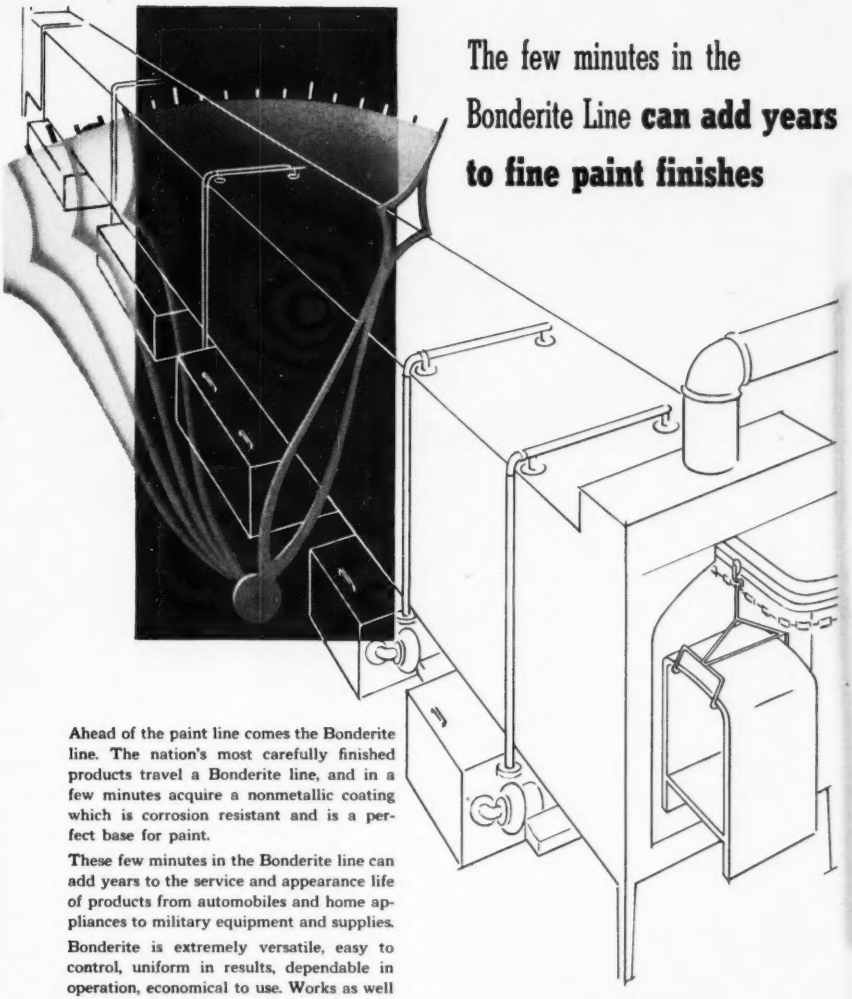
Weissler: "Ultrasonic Investigation of Molecular Properties of Liquids;" Am. Chem. Soc. Journal, 70:1634-40, April, 1948; also, 71:93-5, Jan., 1949.

Ssolowjerva: "The Chemical Action of Ultrasound;" Shurnal Technitscheskoi Fisiki (Russian), 6:2059-2064, 1936.

Wood & Loomis: "The Physical and Biological Effects of High-Frequency Sound Waves of Great Intensity;" Physical Review, 11:29, 373, 1927.

NEW CARS TO RETAIN GLITTER. In spite of reports to the contrary new cars will continue to appear with much of their customary glitter, according to information supplied by leading plating engineers in the automotive industry.

According to information supplied to the American Electroplaters' Society, while such metals as chromium, nickel, copper, cadmium, zinc, and tin are under strict allotment by the Government, the industry is still permitted to protect exposed steel components such as bumpers, bumper guards, and outside door handles with an adequate plating of nickel under a top coating of chromium. Other parts such as the car grille are being plated in accordance with the best procedure sanctioned by the Government. This plate will, according to these engineers, give good service if properly cared for by the car buyer.



The few minutes in the Bonderite Line **can add years to fine paint finishes**

Ahead of the paint line comes the Bonderite line. The nation's most carefully finished products travel a Bonderite line, and in a few minutes acquire a nonmetallic coating which is corrosion resistant and is a perfect base for paint.

These few minutes in the Bonderite line can add years to the service and appearance life of products from automobiles and home appliances to military equipment and supplies.

Bonderite is extremely versatile, easy to control, uniform in results, dependable in operation, economical to use. Works as well in immersion tanks for limited production as on the largest mass production lines.

Get complete information on Bonderite now. Write today!

BONDERITE—corrosion resistant paint base

BONDERITE and BONDERLUBE—aids in cold forming of metals

PARCO COMPOUND—rust resistant

PARCO LUBRITE—wear resistant for friction surfaces

Parker

Parker Rust Proof Company
2172 E. MILWAUKEE AVE.
DETROIT 11, MICHIGAN

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Spotlighting FINISHING Progress

Basic Research and Test Methods Applied to Organic Finishes

By DR. ALLEN G. GRAY

ORGANIC finishes are used by industry to protect, decorate, and augment the function of its products. The vastness of industry and its many products requires a wide knowledge of the component parts of organic coatings and their functions. The technology of metal product finishes has progressed rapidly in recent years. An increasing number of branches of science have exerted their influence to replace empiricism with scientific facts. There is always the need, therefore, to evaulate and interpret recent findings and to apply them to the problems of finishing.

Some of the applications of basic research in the study of organic finishes were discussed at the Second Symposium on Varnish and Paint Chemistry sponsored by New York University College of Engineering. Possibilities of electron microscope methods were presented by Dr. James Hillier, RCA Laboratories. Dr. Max Kronstein, who directed the symposium, discussed the gel state in the formation of organic films and its relationship to the formulation of organic coatings. Included in the program was a demonstration of new test methods important in studying the effects of coating modifications.

Electron Microscope in Coating Research

Dr. Hillier pointed out that the electron microscope is an instrument for studying heterogeneous solid materials. Specifically, structures with

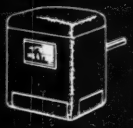
A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

EXPERIENCE UNLIMITED
. . . IN THESE SPECIAL FINISHES

TRUCK FINISHES

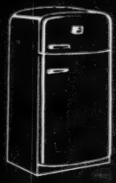
IMPLEMENT FINISHES

APPLIANCE FINISHES



HAMMER FINISHES

CAN COATINGS



REFRIGERATOR WHITES

CHASSIS BLACKS

ORDNANCE FINISHES

BUSINESS MACHINES

FOR OVER 50 YEARS

A half-century of continuous experience in solving "out-of-the-ordinary" finishing problems has given our customers complete confidence in our ability to master their many requirements. KAY & ESS maintains a high ratio of highly skilled chemists to customer's finishing problems which gives you accelerated research —and solves your paint production problems faster, easier and at less cost to you. No matter what your industrial paint needs, you can always bank on KAY & ESS for quality and dependability. Write us today!

Government Specifications

Whether Army, Navy or Aircraft we're equipped to meet your most exacting needs in Government Specification Finishes.

VARNISHES, JAPANS, LACQUERS, & ENAMELS for INDUSTRIAL USES

THE KAY & ESS CO.

KISER and LEO STS.,
DAYTON 4, OHIO

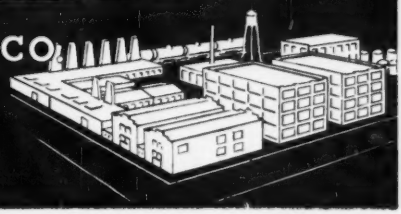


Fig. 2—Electron micrograph of zinc oxide smoke having the same chemical composition and crystal structure as Fig. 1.

dimensions in the range of 10 microns to 0.001 micron are particularly susceptible to study by means of the electron microscope. In discussing the application of electron microscope methods to the study of coating pigments, Dr. Hillier brought out the fact that in the processing operations there is usually a definite correlation between some parameters in the chemical processing and the size or perhaps the shape of the particles produced. Similarly, there is usually some important correlation between the size or shape (or both) and the properties of the finished product. Thus, the electron microscope provides an important means of relating the chemical (or mechanical) processing to the properties of the finished product. Its value comes from the fact that its ability to provide information does not depend on the homogeneity of the material.

Figure I shows a routine electron micrograph of a zinc oxide pigment. Figure 2 is also zinc oxide. It is a smoke but has the same chemical composition and crystal structure. It would be indistinguishable from that in Figure I if examined by the light microscope. On the other hand, its properties as a pigment are entirely different. The electron microscope shows the difference in morphology that is responsible for its different behavior.

The fundamental limit of the resolving power of the light microscope and, for

To page 66→

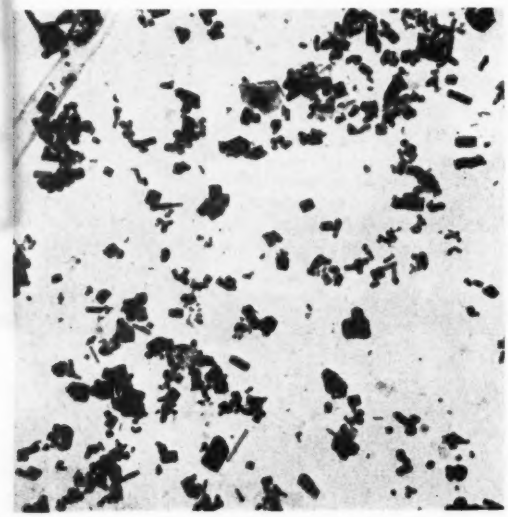


Fig. 1—Routine electron micrograph of zinc oxide paint pigment (magnification 46,000X).

The right START

to the best FINISH!

To obtain the best finish on your final polished product, it is necessary to start with good equipment. The wheel must operate at proper speed and without vibration.

HISEY Buffing and Polishing Machines are designed and constructed to do just that and much more. Operator has plenty of foot room and freedom of operation about the wheels to produce quickly with a minimum of effort.

All moving parts subject to wear are made with liberal reserve capacity and of materials scientifically selected.

All the above added together equals quality product, maximum production, low labor cost and minimum maintenance.
HISEY Buffing and Polishing Machines are made in a wide range of types and sizes from ¼ H.P. bench mounted to 50 H.P. capacity.

DUST COLLECTING EQUIPMENT ALSO AVAILABLE

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

CATALOG 71 PL FREE ON REQUEST

The ribbons of steel that speed through America's strip mills are a part of the heart of our everyday life. They are fabricated into containers of every size and description, into cabinets, automobile bodies, furniture, appliances—their end uses are innumerable. For the precision plating, cleaning, pickling, polishing of this strip, the steel industry looks to Hanson-Van Winkle-Munning and *Platemanship*. Virtually every user of steel . . . from wire through sheet steel to bar stock . . . relies on *Platemanship*.

What does *Platemanship* mean? It means . . .

. . . the availability of the most modern and complete laboratory for the analysis of existing plating processes, equipment and supplies—and for the development of new and improved processes

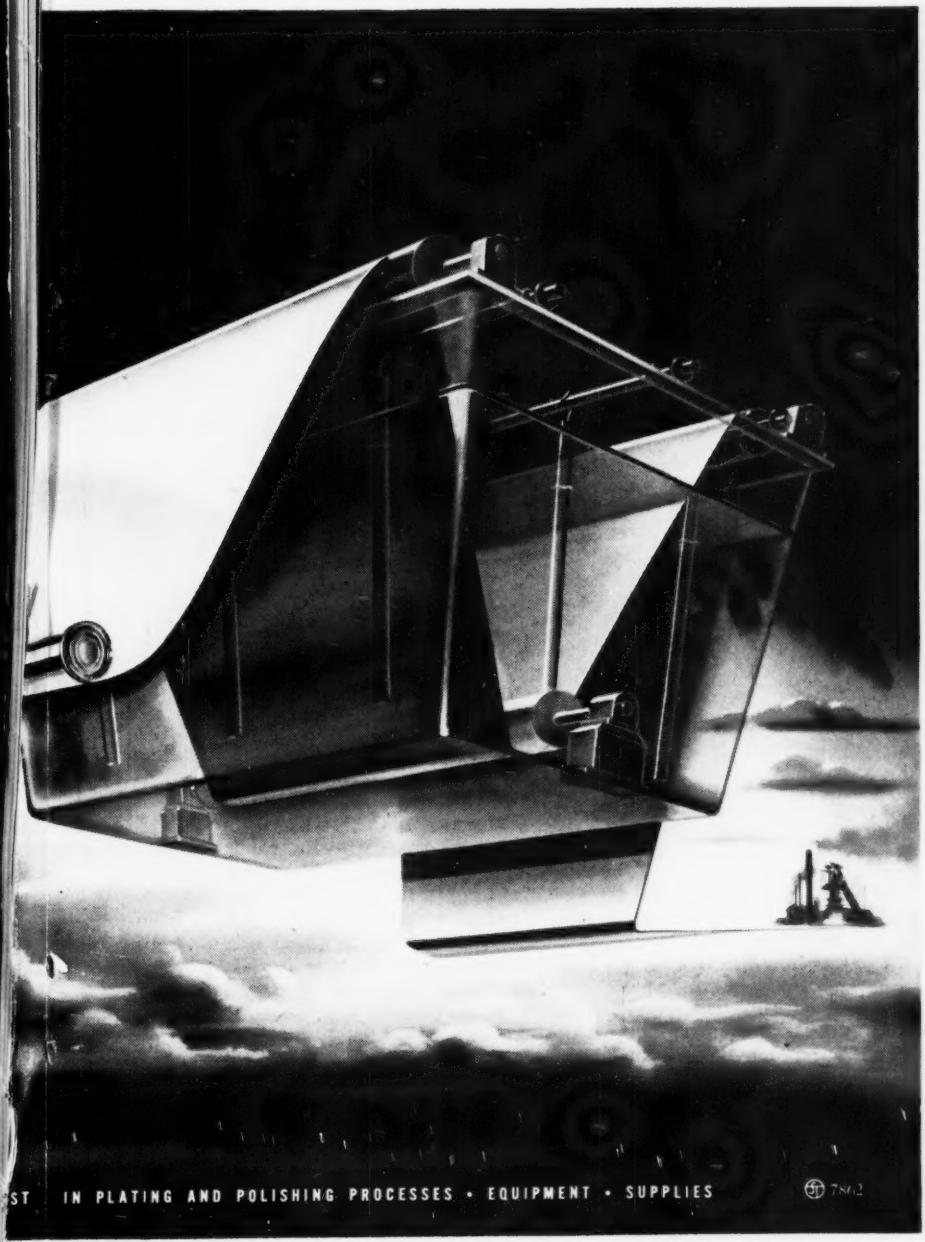
. . . the ability to supply every plating and polishing need from metal cleaners to low-voltage generators to the engineering and installation of fully-automatic precision plating conveyors using specially formulated processes

. . . the tremendous fund of practical knowledge and experience gained by H-VW-M through long and close association with every phase of plating, polishing, anodizing, cleaning and buffing.

The steel industry is not alone in its reliance on H-VW-M and *Platemanship* for precision methods of treating metals. *All* industry relies on H-VW-M for the most advanced methods and supplies, for fully dependable, complete service.

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, N. J.
PLANTS AT: MATAWAN, N. J. • ANDERSON, INDIANA
SALES OFFICES: ANDERSON • BOSTON • CHICAGO • CLEVELAND • DAYTON DETROIT • GRAND RAPIDS • MATAWAN • MILWAUKEE • NEW HAVEN NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SPRINGFIELD (MASS.) • STRATFORD (CONN.) • UTICA

H·VW·M


ST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

that matter, of any microscope is imposed by the laws of diffraction which are, in turn, manifestations of the wave nature of radiation. Thus, no microscope can resolve objects or structures which are separated by less than approximately half the wave length of the radiation used. In the light microscope, according to Dr. Hillier, where the lenses have reached a high degree of technical perfection, this means that details separated by less than 0.2 micron cannot be resolved with visible light or by less than 0.1 micron with ultra-violet light. Obviously, most solid materials have structures which cannot be resolved by these instruments. If we take 0.2 mm. as the resolving limit of the unaided human eye, these limits correspond to maximum useful magnifications of 1000X and 2000X respectively. The electron microscope, using electrons with a wave length 100,000 times smaller, has a correspondingly smaller fundamental limit. Resolving powers of 10 A are possible on suitable specimens. This corresponds to a maximum useful magnification of 200,000X.

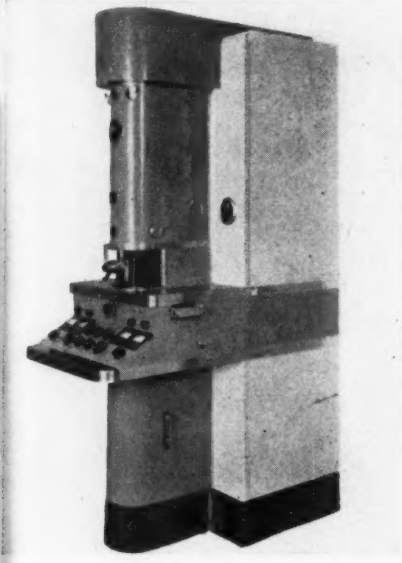
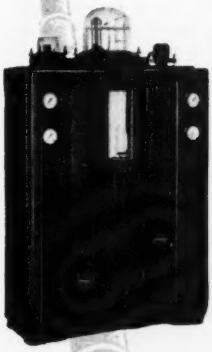


Fig. 3—Photograph of the RCA Model EMU Electron Microscope.
(Photo courtesy RCA Laboratories, Princeton, N. J.)

Figure 3 shows a photograph of an RCA Electron Microscope. It consists essentially of a large vacuum chamber enclosing the electron source, the condenser lens, the specimen stage, the objective and projection (ocular) lenses, a fluorescent screen and photographic plate. External to the instrument are the power supplies, including a 50-kilovolt source to accelerate the electrons, and a separate source of current to provide the magnetic field for each of the lenses. The main feature of these power supplies is their extreme stability. Since the focal length of the lenses depends on the velocity of the electrons and on the strength of the magnetic fields, it is necessary that all of the power supplies remain constant during the exposure time. The function and behavior of each of the lenses in the electron microscope is the same as its counterpart in the light microscope. There are, however, many quantitive differences which are important. Most electron microscopes can be adjusted to operate over a wide range of magnifications between 100 and 25,000 or more.

It was emphasized by Dr. Hillier that the connecting link between the electron microscope and a research problem comes invariably in the preparation of a specimen suitable for the instrument. Several requirements must be met. The specimen must be thin, less than 0.1 micron for most materials. It must be free of volatile liquids and capable of withstanding high vacuum without change. The specimen which satisfies these conditions must still be a true representation of the original material. While any new use of the electron microscope requires some attention to the problem of specimen preparation, the number of techniques already developed is so large that more

CHLORINATION *Employed...* CYANIDES *Destroyed*



The treatment of cyanide wastes is a difficult problem which is growing more acute daily. Increasingly stringent stream pollution legislation has placed a heavy demand on industry for the complete destruction of cyanides.

Effective, economical treatment of cyanide wastes requires versatile equipment and experience. The Wallace & Tiernan organization brings you both from its record of equipment installations in over 25 cyanide waste treatment plants.

A complete line of W&T Chlorinators and Chemical Feed Equipment, backed by 37 years experience in the chlorination of water, sewage and industrial wastes, is an assurance that there is always available from W&T a proven chlorinator to fit the needs of your particular cyanide waste problem.

Write today to arrange for a visit from your W&T Representative or for technical bulletins on cyanide waste treatment.

S-63a

WALLACE & TIERNAN
COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

SPECIALIZATION
Saves You Money
on
THINNERS

We make nothing but Thinners—blended Solvents, and nothing else. Naturally, we buy large quantities of solvents—at lowest prices. Specialization saves us money on overhead too—and these savings we pass on to you, our customers.

We know how to formulate Thinners to your requirements—been doing it for 26 years. We've satisfied big and little customers . . . let us show you how a Lacquer Thinner SPECIALIST can supply you with the right Thinner . . . and still save you money.

Just fill out form below and mail today. We'll work out a Thinner especially for you, and send a sample. Think we can do it for 85¢ or less a gallon too!

POTTER PAINT CO., INC.
CORTLAND 2, N.Y.
THINNER SPECIALISTS

The product we make is:_____
We use Lacquer Thinner for:
☐ Spray ☐ Dip ☐ Cleaning ☐ Other_____
We use Lacquer Thinner on:
☐ Metal ☐ Wood ☐ Other_____
We want it to dry:
☐ Fast ☐ Slow ☐ Medium

Name_____
Address_____
City_____ Zone____ State_____

than a slight modification of one of them is rarely necessary.

Preparation of Sample for Electron Microscope

Dr. Hillier discussed three basic techniques for preparation of samples: the mounting of solid particles; the replication of surfaces; the sectioning of bulk solids. The only type of powder that can not be examined directly in the electron microscope is one which sublimes in a vacuum at a relatively low temperature. There are routine techniques for preparing all types of powders. If the powder is soluble, some sort of dry mount is necessary. This may involve dispersion and deposition on a thin membrane by thermal precipitation or by electrostatic dispersion or precipitation. If the powder is insoluble in both water and the organic solvent used to dissolve the membrane producing material, the most useful and generally successful method involves dispersion of the particles in the solution before the production of the membrane. If the particles are very small (less than 0.02 micron) and can be dispersed easily in the solution, it is usual to produce the thin membrane by casting on water. For larger particles, or those that tend to remain flocculated, this method is unsuccessful. In this case, it is better to disperse the particles in a thin film of the solution on a smooth glass plate and to strip the film after the solvent has evaporated.

Dr. Hillier pointed out that very often a research problem requires visualization of the surface of a bulk solid. Since it is not possible to obtain such an image directly by means of the electron microscope, some indirect method must be used. The most successful of these is the thin surface replica. This is a mold or cast of the surface which reproduces the configuration of the surface and yet is sufficiently thin to be examined in the electron microscope. There are now available a large number of variations to the replica techni-

Step-up your production with

Strand
FLEXIBLE SHAFTS

Flexible Shaft Machines

BENCH MOUNTING

Here is convenient flexible shaft equipment that can be mounted on bench right near the work. Portable to the extent that it can be taken from place to place. For steady, fast production, consider the bench-mounted flexible shaft machine as part of your production setup. Model shown is three-speed mounted on swivel type adjustable bench column. Available in ⅓ H. P.

FLOOR MOUNTING

The floor-mounted flexible shaft machine is one of the most popular. It can be moved from place to place. Amply powered, the standard is out of the way while the head is light and easy to work with. Model shown is three-speed mounted on swivel yoke adjustable floor type tripod. Available in ⅓ H. P. to 1½ H. P. inclusive.

The Balmar Corporation
Woodberry, Baltimore 11, Md.
N. A. STRAND DIVISION
5001 N. Wolcott,
Chicago 40

STRAND

FLEXIBLE SHAFTS and FLEXIBLE SHAFT MACHINES

SALES OFFICES: CHICAGO, BALTIMORE and TULSA

que, the best of which can provide an accurate picture of details as small as 0.005 micron.

According to Dr. Hillier, the simpliest method which is useful for non-porous surfaces that are not soluble in organic solvents is known as the "stripping" technique. It involves coating the surface with a solution of a plastic (usually collodion in amyl acetate) and allowing the solvent to evaporate. The concentration of the solution and the thickness of the coat are adjusted so that a dried film approximately 0.1 micron thick is obtained. The area to be replicated is usually surrounded with a frame of somewhat greater thickness. The coated surface is then immersed in warm water and after a few minutes the film is carefully teased off with a needle and a fine pair of tweezers. Unless the surface is extremely rough there is rarely any difficulty in removing a film of this thickness. After it has been removed, the film is brought to the surface carefully with the replica side facing upward. After it has dried, the replica side is shadow-cast with palladium or chromium. By shadow-casting with a thin film of heavy metal, the replica surface is emphasized and the image obtained can be interpreted as though it were simply an obliquely illuminated opaque surface, the effects of the varying thickness of the replica and the presence of a second surface being largely eliminated from the image. However, it must be remembered that such a replica is a "negative" and thus a peak in the replica represents a valley in the original sample.

If the surface to be examined is soluble in the organic solvents that are used, it is necessary to resort to another type of replica. One good technique involves placing the specimen in a vacuum evaporator and depositing on its surface, in a perpendicular direction, two layers of materials. The first of these is a thin layer (approximately

KEEP BOOTHS FIRE-SAFE THIS LABOR-SAVING WAY

WITH

LIQUID ENVELOPE

PEELABLE SPRAY-BOOTH COATING

Using expensive labor to scrape down spray-booths costs a lot more than peeling off accumulated overspray in big sheets. Safer, too. Order a 5-gallon Test-Sample at Drum Lot price.

BETTER FINISHES & COATINGS, INC.

268 Doremus Avenue, Newark 5, N. J.

122 East 7th St., Los Angeles 14, Calif.

DISTRIBUTED BY

General Spray Equipment Co., Boston, Mass.

Bay State Spray Equipment Co., Springfield, Mass.

Lea Manufacturing Co., Waterbury, Conn.

Edgcomb Steel of New England, Milford, Conn.

Kellerman Paint Co., New York, N. Y.

Grapek Paint Co., Newark, N. J.

M. Buten & Sons, Inc., Philadelphia, Pa.

R. W. Renton Co., Cleveland, Ohio, Indianapolis, Ind.

Dean & Barry Co., Columbus, Ohio

Vic Miner Co., Toledo, Ohio

Abrasive & Supply Co., Detroit, Mich.

Melson Industrial Supply Corp., Grand Rapids, Mich.

O'Donohue Sales Co., Milwaukee, Wis.

Paints & Lacquers, Inc., Chicago, Ill.

Tanner & Co., Indianapolis, Ind.

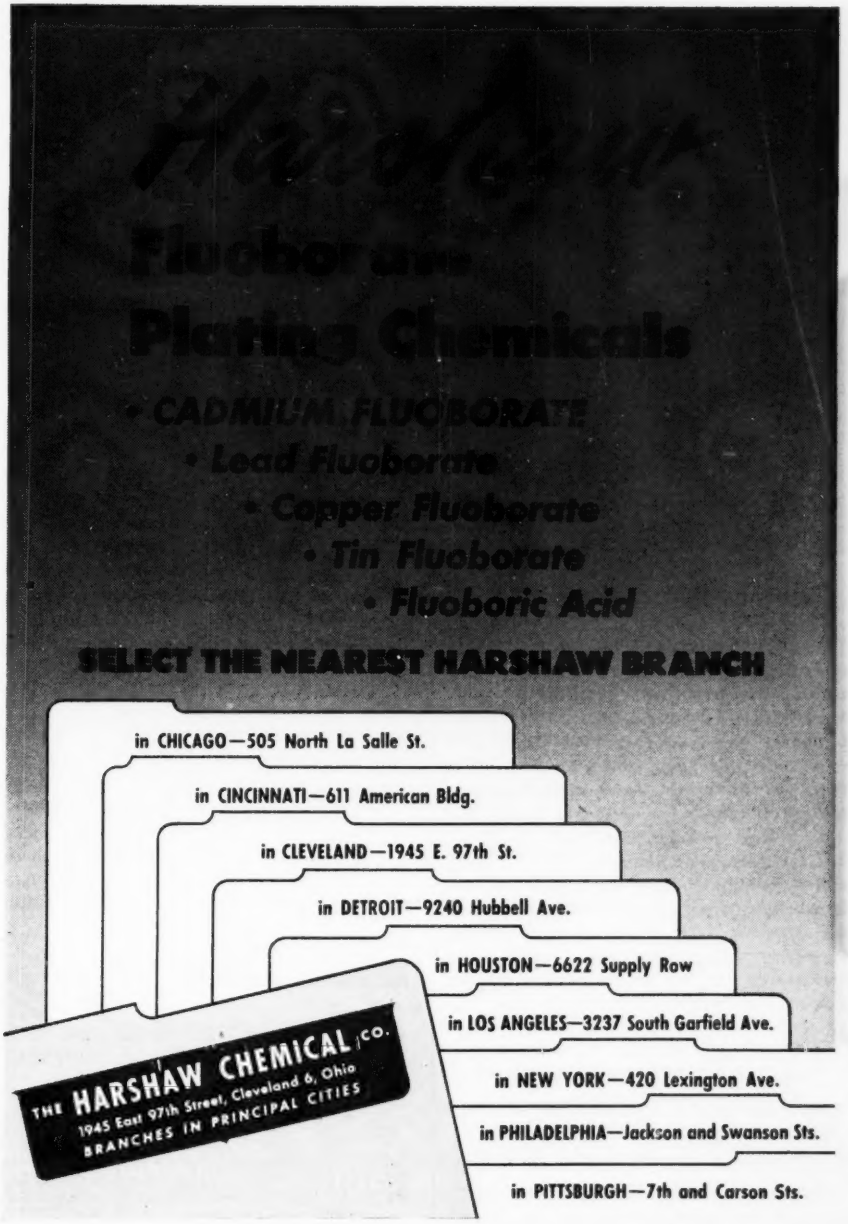
Metal Goods Corp., St. Louis, Mo., North Kansas City, Mo., Dallas, Texas, New Orleans, La.

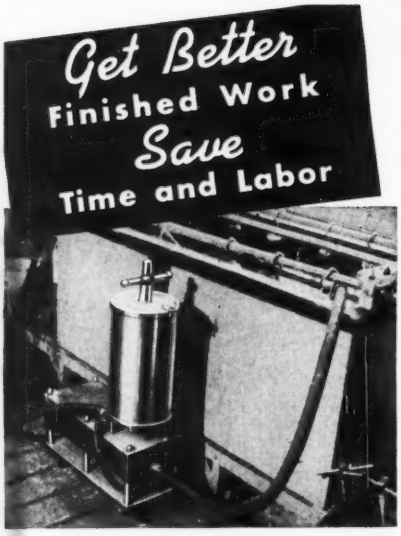
Hubbard & Stau, Los Angeles, Calif.

M. E. Smith Co., Los Angeles, Calif.

C & H Supply Co., Seattle, Wash.

Hugh Russel & Sons Ltd., Montreal & Toronto, Canada


Fluoborate
Fluobor and
Plating Chemicals
• CADMIUM FLUOBORATE
• Lead Fluoborate
• Copper Fluoborate
• Tin Fluoborate
• Fluoboric Acid
SELECT THE NEAREST HARSHAW BRANCH
in CHICAGO—505 North La Salle St.
in CINCINNATI—611 American Bldg.
in CLEVELAND—1945 E. 97th St.
in DETROIT—9240 Hubbell Ave.
in HOUSTON—6622 Supply Row
in LOS ANGELES—3237 South Garfield Ave.
in NEW YORK—420 Lexington Ave.
in PHILADELPHIA—Jackson and Swanson Sts.
in PITTSBURGH—7th and Carson Sts.
THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES



With a "Sealed-Disc" Filter

You'll get better finished plated work, save time and labor and you'll get longer service life from your plating solutions. More and more cost-minded platers depend on Alsop *"Sealed-Disc"* Filters, to remove all dirt, dust and oil-sludge from their solutions and keep their solutions free from even the invisible impurities that cause trouble. Users of *"Sealed-Disc"* Filters save time and labor, they know that their clean work is being put into bright, clean solutions. Regardless of the size or type of your installation, there's a *"Sealed-Disc"* Filter to *"fit your job"*—write for complete information or contact your regular plating supplier.

Write to:

ALSOP ENGINEERING CORPORATION
611 Keen Street, Milldale, Conn.

ALSOP ENGINEERING CORPORATION
Filters. Filter Discs. Mixers. Pumps. Tanks

100 A) of a water soluble material. Fuchsin dye or sodium chloride are most often used. The second, which must be deposited without breaking the vacuum after the first evaporation, is of some homogeneous material which is not water soluble. Silicon monoxide, silicon dioxide, magnesium fluoride, beryllium, or chromium can be used. If the equipment has enough connections, it is then convenient to evaporate a third layer (a heavy metal), obliquely, as a shadow-casting layer. The replica is then floated off on water.

Study of Metal Surfaces and Electroplates

In surveying techniques for measurement of surface smoothness in a paper before the 37th Annual Convention of the American Electroplaters' Society, Henry L. Kellner, Lea Manufacturing Company, brought out the fact that the electron microscope is a useful instrument for evaluating very smooth surfaces in the range of 0.025 micron r.m.s. and lower. Dr. Kellner pointed out that in the investigation of any process for smoothing a metallic surface it is necessary to have some definite means of evaluating the smoothness in order to determine the extent of the improvement. A plastic replica of the surface is used. This is coated with a thin metal film, usually chromium or germanium, that is deposited by evaporation at a known oblique angle in an auxiliary vacuum chamber. This oblique coating

CORROSION-PROOF LININGS CEMENTS BRICK

- TANKS, FLOORS, FUME DUCTS AND PROCESS EQUIPMENT
- COMPLETE LINE OF PROTECTIVE COATINGS . .

Over a Quarter Century of Experience

CEILCOTE **CORROSION-PROOF**
MATERIALS • CONSTRUCTION • SUPERVISION
The CEILCOTE Co. 4832 RIDGE RD. CLEVELAND 9, OHIO

To meet MILITARY SPECIFICATIONS

for Cleaning • Rust-Removing • Etching Phosphatizing and General Metal Conditioning of all kinds of Metal Surfaces

Use PREP PRODUCTS!

SPECIFICATION NUMBER	CONFORMING MATERIAL
MIL-C-5541 (see also QPL-5541-1)	Lyfanite
MIL-S-5002	Lyfanite
MIL-C-10578	
Type 1	Metalprep Nos. 77, 102—Alumiprep No. 1
Type 2	Metalprep Nos. 10, 15—Alumiprep No. 20
JAN-C-490—Grade II	
Type 2	Emulsoprep
Type 4	Metalprep, Prep-Pik-L, Alumiprep, Prep-Rite
Type 5	Metalprep, Alumiprep, Prep-Pik-L, Prepwash
Type 6	Emulsoprep No. 710-E.C.
U.S.A. 3-213	(See MIL-C-10578)
U.S.A. 3-192	Metalprep Nos. 28, 10, 15 Alumiprep No. 20
U.S.A. 98-20007	Metalprep Nos. 10, 15 Alumiprep No. 20 Prep-Rite No. 16
U.S.A. 72-53	(See AN-F-20)
AN-F-20	Lyfanite
	Metalprep Nos. 10, 15, 77, 102 / Alumiprep Nos. 1 and 20 — See MIL-C-10578
AN-E-19	Lyfanite
AN-C-170	(See MIL-C-5541)
TAC-ES-431	(See MIL-C-10578)
AXS-1245	(See JAN-C-490, Grade II)
Engineering Corps—T-1184	Metalprep No. 28
U.S.N.—Appendix 6	Metalprep

51-C

Send for Data Sheet • Advise Govt. Spec. Number

NEILSON CHEMICAL CO.

2682 Tecumseh Rd., Windsor, Ont.

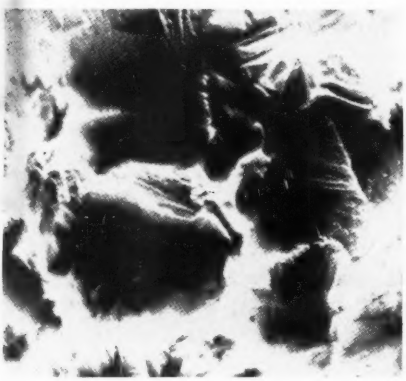
6561 BENSON ST., DETROIT 7, MICH.

3411 Union Pacific Ave. Los Angeles 23, Calif.

method causes the higher elevations of the plastic replica to cast total or partial metallic "shadows" on the sides or slopes away from the filament and the heights are estimated from the length of the shadows cast. This technique reveals heights which are so small that they would not otherwise show contrast against the background of the remainder of the specimen. The electron microscope used with such replicas not only has the advantage of greater resolving power than that of the light microscope, but because of its relatively small numerical aperture and greater depth of focus, can show at higher magnification the different levels of the surface being studied. Such methods reproduce all the fine detail of a surface necessary for an accurate study of surface smoothness.

Although this discussion deals with organic coatings, it is of interest to mention that the electron microscope has also been used to study the structure of nickel electroplates. Figure 4 shows an electron micrograph of a matte nickel deposit; Fig. 5 shows a semi-bright nickel plate. These electron micrographs were made by G. L. Clark and S. H. Simonsen, University of Illinois, in cooperation with the Harshaw Chemical Company as part of a study carried out on the relationship between orientation, grain size, and brightness in nickel electrodeposits, the results of which were described in a paper before the 98th Meeting of the Electrochemical Society.

Fig. 4—Electron micrograph of matte nickel plated surface 5,000X. Shadow cast with chromium.
(Photo courtesy The Electrochemical Society, Inc., New York 25, N. Y.)



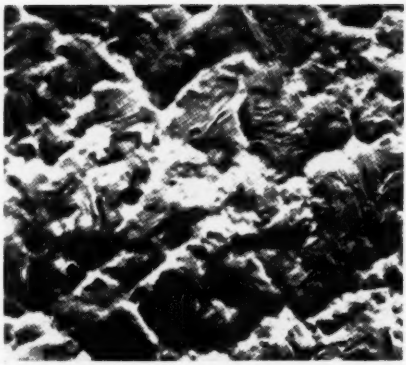


Fig. 5 — Electron micrograph of semi-bright nickel plated surface 5,000X. Shadow cast with chromium.
(Photo courtesy The Electrochemical Society, Inc., New York 25, N. Y.)

Thin Sectioning of Solids for Examination of Paint Films

For the examination of paint films, the most direct approach, according to Dr. Hillier, is that of sectioning, but the sections obtained must be very thin, that is, less than 0.2 micron to less than 0.05 micron, depending on the material and the desired resolution. A typical method involves modifying a standard rotary type microtome so that the unit of advance is between 0.02 micron and 0.05 micron, and so that static friction in the various sliding parts and vibrations from the driving mechanism, or from external sources are minimized.

A particularly useful development involves collecting the sections on a liquid as they are cut. By this means, serial sections can be cut enabling an accur-

nyb

Investigate

STEELFIN!

It has everything you want in Heavy Duty Heat Surface

BUILT TO MEET MODERN INDUSTRIAL REQUIREMENTS

For Continuous Heat Service up to 150 Pounds Steam Pressure

The rugged arc welded construction outperforms and outlasts heating elements made of thinner non-ferrous metals, avoids their expansion-contraction faults, yet has the same BTU efficiency.

Originated in 1922, it has an enviable record of dependable performance.

WRITE FOR YOUR COPY OF BULLETIN 514, ALSO 492 WHICH GIVES ENGINEERING DETAILS

nyb **THE NEW YORK BLOWER COMPANY**

SALES OFFICES • 32nd STREET and SHIELDS AVENUE • CHICAGO 16

FACTORY, LAPORTE, INDIANA

How to Buy the Best Gloves for the Job... At Lowest Cost!

N-54 All milled DuPont neoprene Stanzoils, heavyweight. Non-slip grip, curved or straight fingers.

PIONEER

Stanzoils®

Smart buyers find it doesn't pay to buy one kind of glove for several different jobs, even if it's cheap. What pays is good protection for workers' hands PLUS gloves that make work easier and faster. Fit gloves efficiently to the job for more production — and new PIONEER catalog shows you how. *Unbiased advice, for Stanzoils include all kinds of liquidtight gloves:* all-neoprene, neoprene or plastic coated, 32 styles, weights, sizes, colors. You profit from scientific glove selection — write for this helpful catalog today!

Industrial Glove Division
The PIONEER Rubber Co.
685 Tiffin Road
Willard, Ohio

STANZOIL PIONEER

OVER 30 Years OF QUALITY GLOVE MAKING

P.S. If your glove problems are unusual because of the nature of your product finishing operations, PIONEER welcomes the opportunity to help you solve them. Write us about your needs and problems — you'll save money, improve your glove service.

ate three dimensional visualization of the specimen to be obtained. At present the greatest value of serial sectioning comes from the fact that it provides sensitive criteria both for the operation of the microtome and of the artifacts introduced by the cutting or any subsequent treatment of the sections. The entire technique makes it possible to cut sections of thicknesses in the range 0.1 micron to 0.3 micron and with structural resolutions of the order of 200 Å.

The Gel State in the Formation of Organic Coatings

Dr. Max Kronstein, a member of the New York University College of Engineering staff, presented fundamental data before the Symposium on the gel state in the formation of organic films and the relationship to the formulation of organic coating materials. Dr. Kronstein pointed out that this work was concerned with the gel state of oils and their modifications, and included those materials which are basically polyhydroxyl alcohol-fatty acid esters. Their modifications included not only chemical changes produced on these oils directly, but also those compounds which can be seen as mixed esters between polyhydroxyl alcohols and partially fatty acids-partially other acids, such as the alkyd finishes.

The initial state of these oils is characterized as the soluble state. That means the state where they are either liquid at room temperature or melt into a liquid form at an elevated temperature, and where they can be uniformly or molecularly dispersed in other liquids or melting mediums like solvents, other oils, resins, or asphalt compounds. The gel state characterizes the condition where these oils or their compounds, by heating or other chemical action, are no longer molecularly dispersable but where they are capable of increasing their volume in contact with suitable low-viscous substances; that is, where they are capable of swelling. In this state the gels show

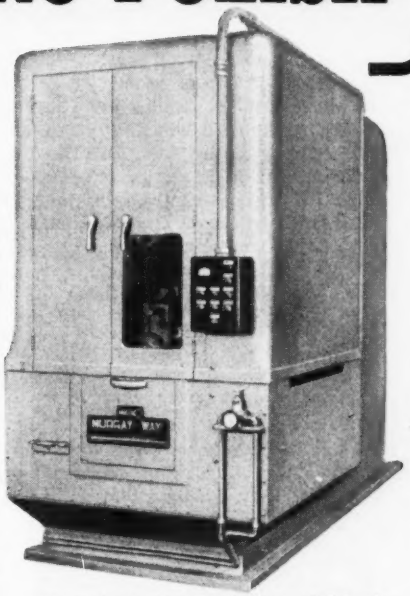
STRETCH YOUR STEEL ALLOTMENT with MICRO-POLISH

If your production is curtailed by government steel restrictions, why not get relief the Micro-Polish way?

Many manufacturers have found extra tons of steel for their plant by prepolishing cheaper, less-restricted grades to usability before stamping or processing. There's an additional, worthwhile saving in wear and tear on your dies too.

MICRO-POLISH is tailor-made for a job like this. Engineered to put a micro-fine, uniform surface on all kinds of roll, sheet or blanked steel, fast and economically. MICRO-POLISH gives you uniformity of surface finish to insure uniformity in your finished product.

Murray-Way engineers have helped hundreds of manufacturers with their metal-surfacing problems. They will gladly help you with yours.



Pictured above is a standard Micro-Polish unit. These units can be used separately or in series to accomplish the necessary polishing operation.

Murray-Way has standard equipment for practically every polishing or buffing need. We specialize in custom-built equipment for the unusual job.

MURRAY WAY

THE MURRAY-WAY CORPORATION

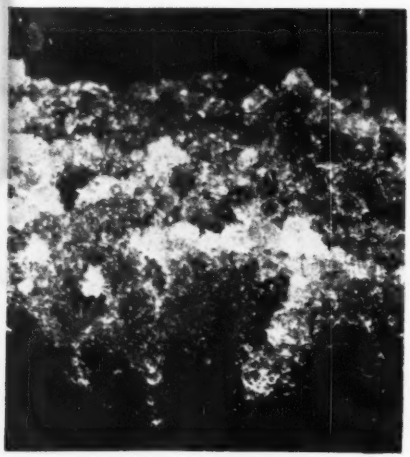
POST OFFICE BOX 180 — BIRMINGHAM, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT

an increasing cohesion—an increasing tendency of forming and of retaining a coherence between the various particles to such an extent that the gel might be stretched to a certain limit and will, when released, return to its original form. Figure 6 shows the solid, non-coherent phase of linseed oil in its swollen condition,—a form not capable of forming coherent films.

Dr. Kronstein stated that his findings have shown that the gel state and the solid state of the oils used in coating formulations have clearly defined characteristics which allow intensive studies in their infra-red spectra, their diffraction X-ray spectra, and in their appearance under the electron microscope. Figure 7 shows an electron microscope representation of China wood oil gel with sweller removed under vacuum. The technique applied was that of depositing, under vacuum, very thin layers of chromium on the organic specimens and thus increasing their shadowing under the microscope. It was pointed out by Dr. Kronstein that the films

Fig. 6—The solid, non-coherent phase of linseed oil in its swollen condition. This phase is not capable of forming coherent films. *(Photo courtesy RCA Laboratories, Princeton, N. J.)*



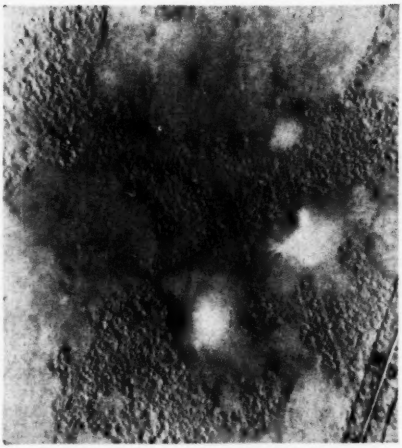


Fig. 7—Electron micrograph of China wood oil gel with sweller removed under vacuum (magnification 42,500X). *(Photo courtesy RCA Laboratories, Princeton, N. J.)*

of this gelled China wood oil show, even in this thickness of only 0.002 micron, the same appearance which the heavy China wood oil films show so frequently in practical application. Figure 8 shows an electron microscope picture of the same China wood oil which had been heated closer to its solidification state; the characteristics of the previous Fig. 7 are shown to a lesser extent. These tests indicate that with the increase of the solid phase the coherence of the gel substance decreased also. These studies show the possibilities of electron microscope work for studies in bringing about an understanding of the mechanism of oil insolubilizations to give the types of coatings required in modern metal finishes.

Dr. Kronstein pointed out that the chemical modification of oils, alkyds, and so on, from the soluble state to the final solid and incoherent state, passes the important wide area of the gel condition. Tests have shown that these oil-gels are capable of additional saturation of their double-bonds in their com-

"Don't worry Grandma... he ain't about to hurt that *VEDOC* finish."

Folks soon find out your washers really stand up when they are protected with *Vedoc*. It's the hardest wearing, one-coat baked finish you can find. It matches perfectly to Porcelain enameled tubs . . . has high resistance to soaps and alkalies . . . is easily cleaned . . . and gives maximum protection against rust.

Vedoc finishes are formulated to work best with your particular production process. We make sure of this with every order for Vedoc finishes. Write us today for your requirements.

Remember, Ferro is set up to provide complete Organic Coatings service . . . from the development of specialized coatings, to the design and installation of complete Finishing Oven processes.

FERRO CORPORATION

LIQUID PLASTICS DIVISION

4150 East 56th Street · Cleveland 5, Ohio

Vedoc

Fig. 8—Electron microscope picture of same China wood oil as Fig. 7 which has been heated closer to its solidification state (magnification 42,500X). (*Photo courtesy RCA Laboratories, Princeton, N. J.*)

pounds or, in practical terms, they are capable of additional oxygen absorption. Infra-red spectrum studies have provided additional information on the mechanism of these reactions. It has been shown, for instance, that drying oils like tung oil or linseed oil not only solidify more easily than semi- or non-drying oils, but that their solidification products also showed, immediately, a more extensive shifting in the infra-red spectrum in the area around 1000 and 1150 cm^{-1}. Tests also have shown that the semi-drying and non-drying oils produce the same kind of solids and that their solids show such shifting gradually during exposure to air at about 212 deg. Fahrenheit.

In discussing the results of additional tests, Dr. Kronstein stated that in comparing their spectra between 950 and 100 cm^{-1}, the drying oils show a characteristic line which is less clear in the semi-drying oils like soybean oil. It also appears that this line is clearly different in a heat-gelled linseed oil from what it is in the refined linseed oil. It is differently orientated and shifted into a position more similar to that which it retains during the solidification. In the case of soybean oil, tests indicated even more clearly a case of a different grouping of the unsaturation insofar as the solids of the soybean oil have at first a more extensive line than they had in the initial oil. This line was found to decrease when the solids were exposed to air at a temperature of 212 deg. F. whereby a considerable amount of oxygen was absorbed. Studies of this kind will be useful in establishing what kind of reorientation is occuring during drying.

Liquefied Pregelled Oils

Dr. Kronstein suggested that the swelling, insoluble gels might be viewed as a condition between two extreme phases: the soluble, initial one; the solid, incoherent one. It also appears that in such a condition it should be possible to move the equilibrium further to the liquid phase, whereby a condition would be reached where the substance can be distributed in liquids, combined with other oils or resins or asphalts even while the insoluble nuclei remain present. It is possible to melt the insoluble gelled oils with suitable contact substances which contain what can chemically be classified as metal-soap substances. In this manner, a complete liquefaction can be obtained. These were termed liquefied pregelled oils.

These oils can be brought in solution and can be compounded with other oils, asphalts and resins, and they can be diluted with a wide variety of solvents, such as the common varnish, coal tar solvents, as well as VM & P naphthas. They can be applied as coatings by dipping, brushing or spraying. They can be combined with other varnish compounds. These compounds are chemically different from the initial oils, as shown by their diffraction X-ray spectra. Another unusual property is that

NOW-Get All These Advantages of a NON-FOAMING WATER WASH

PELRON'S CLEARWASHES WILL NOT FOAM!

CLEARWASH 370 used in water curtain spray booths will float over 90 percent of the oversprayed paint, as well as eliminate foam in the spray booth. Oversprayed paint is conditioned not to clog the circulating system nor to adhere to the booth walls. Economical in that its first cost is low, a little goes a long way, and much expense is saved in cleaning reservoirs, pipelines, booth walls, etc. Details in Technical Bulletin 129.

ARE YOU ACQUAINTED WITH PELRON'S AIDS AND SERVICES TO THE FINISHING DEPARTMENT?

EMULSION CLEANERS
New principal — partly emulsified soil floats away. Fast, economical, safe.

STRIPPERS
Cold stripping of lacquers, japan, baked enamels. Fast, safe, economical.

PHOSCOTE
Cleans and phosphates in one operation. Economical to use on steel or aluminum. Increases paint-adherence.

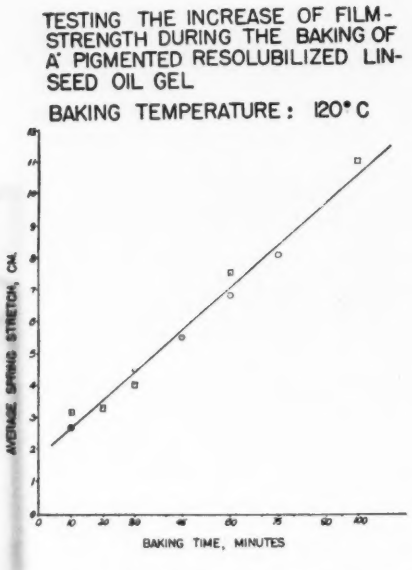
TECHNICAL BULLETINS
Complete details of application methods for all cleaning and surface preparation materials.

TELL US YOUR PROBLEMS . . . WE WILL RECOMMEND THE CORRECT PELRON PRODUCTS TO SOLVE THEM

PELRON CORPORATION

7740 W. 47TH STREET, LYONS, ILLINOIS

CHICAGO • DETROIT • CLEVELAND • BUFFALO • SOUTH BEND
MILWAUKEE • INDIANAPOLIS • ROCK ISLAND


TESTING THE INCREASE OF FILM-STRENGTH DURING THE BAKING OF A PIGMENTED RESOLUBILIZED LINSEED OIL GEL
BAKING TEMPERATURE: 120° C
AVERAGE SPRING STRETCH, CM.
BAKING TIME, MINUTES

THE SPRING STRETCH REFERS TO A NEW TESTING METHOD BY MEANS OF THE JOLLY BALANCE AND INDICATES THE PROGRESS OF CURING.

Fig. 9

films produced from these resolubilized, pregelled oils have a very interesting seed effect on monostyrene insofar as they result in the formation of film-like, insoluble and infusible styrene growth. This was thought to be caused by a regular distribution of the solidification nuclei throughout the film.

Tests on the practical applications of these pregelled and reliquefied oils showed that when used as varnishes they gave unusual insulating qualities.

A reliquefied linseed oil gel applied to sheet metal showed very great mechanical strength and elasticity; after 2½ years storage under varied atmospheric conditions, the films retained their adhesion and elasticity in 180 degree bend. Also, the pregelled, cured films showed increased solvent and oil resistance and increase in resistance to moisture penetration with the progressing oxidation. The fact that the solidification of oils does not necessarily require the saturation of all double-bonds allows their further oxidation afterwards, whereby substances of greater solvent resistance are obtained. The reliquefied oil gels are capable of regular curing processes.

Test Methods

Research on coating materials requires test methods for evaluation of the properties of the films that are produced. A large variety of physical tests and test methods have been developed to assist in relating the properties of organic coatings to their performance in practice. Many of these tests seek information as to the hardness, distensibility, adherence, resistance to scratching, impact or abrasion.

Dr. Kronstein discussed the test method used to trace the progress of the cure of these resolubilized pregelled oils. This was studied by imbedding fine magnet wire ends in the coating under standard conditions and then pulling them at certain time intervals during baking, one at a time, from the curing film by the action of a calibrated spring. This spring is extended by a slow motor and the extension which the

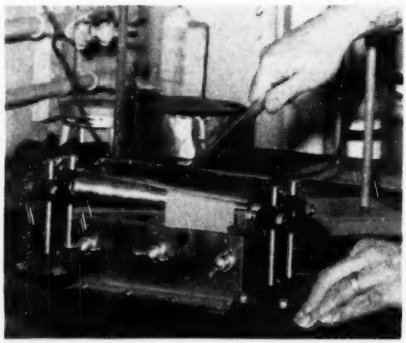


Fig. 10—Mandrel test used at New York University College of Engineering to study the effect of bending on organic finishes. (*Photo courtesy New York University College of Engineering, New York 53, N. Y.*)

? What's Ahead IN DEFENSE PRODUCTION?

CONSULT KOCH FOR YOUR FINISHING REQUIREMENTS

Whatever defense contracts may come your way KOCH stands ready to step in and produce a complete finishing system that will insure top production at peak efficiency.

KOCH'S single responsibility, from layout through installation, saves you headaches and money. Let our experts tell you how.

PHONE, WIRE OR WRITE FOR DETAILS!

GEORGE KOCH SONS, INC.
EVANSVILLE, INDIANA

spring reaches before it pulls the wire end from the film is plotted as shown in Fig. 9. This graph shows that in plotting the minutes of baking time against the spring stretch in centimeters, the strength or the cohesion of the

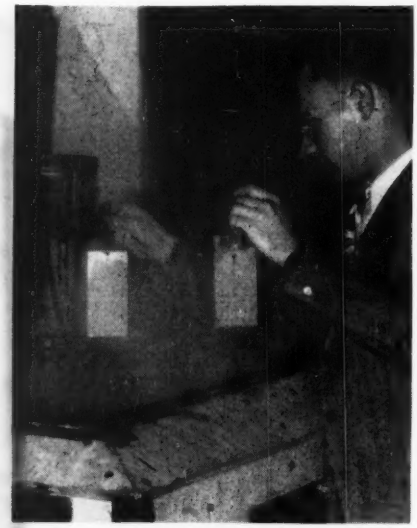


Fig. 11 — Removing coated panels from salt spray test cabinet at New York University College of Engineering Laboratories. *(Photo courtesy New York University College of Engineering, New York 53, N. Y.)*

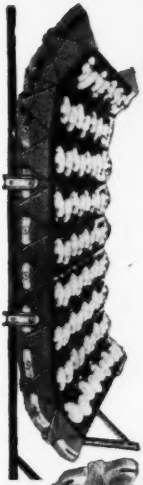
coating system progressed in nearly a straight line during the period of 100 minutes. This particular test was made on a paint which was composed of a zinc chromate pigment with a resolubilized pregelled linseed oil as a binder.

Two types of tests have been developed for the determination of the distensibility of cured films, one in which the detached film of material is tested and the other in which the film remains on a test panel. The first method uses some modification of the usual tensile testing machine, whereas the latter is based upon the distortion produced when formed over a mandrel which may be either cylindrical, conical or spherical. Figure 10 shows the mandrel test that is used in New York University College of Engineering Laboratories to study the effect of bending on organic finishes. The conical mandrel test has been found to be quite satisfactory for general testing purposes and has been specified in A.S.T.M. specifications.

The electrographic printing method has been used three years in the paint research laboratories of New York University in the development and evaluation of new coatings and the modification of commercial coatings. Used in conjunction with many of the usual test methods such as salt-fog exposure, Weather-ometer exposure, and others, it provides a means for the detection of the permeability and underfilm spreading of moisture in organic coatings. The test method used is simple and may be applied without complicated equipment. A Carver 10-ton laboratory press is used with the coated test panel, printing paper and blotting paper placed between anode and cathode platens, which, in turn, are insulated from the press itself by rubber sheets. Figure 11 shows research assistant at New York University removing coated panels from salt-fog test.

In connection with electrical test methods, it is of interest to note at the recent 119th American Chemical Society Meeting, A. C. Elm, New Jersey Zinc Company, reported that changes in electrolytic resistance of a paint film during its immersion in salt solution afford a simple means for evaluating its metal-protective properties. In the tests reported a number of paint systems were examined for their resistance to diffusion of sodium chloride. The paint systems which had in actual use demonstrated the best anti-corrosion properties were generally the ones which maintained the best resistance to electrolytic diffusion. Although the test provides a good indication, it cannot be relied upon entirely, since other pro-

Patent-Flex
INFRA-RED OVENS

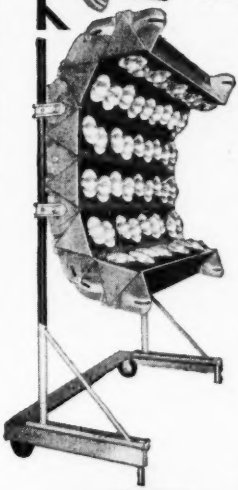


PATENT-FLEX "oven-shape-adjustment" guarantees that you can obtain maximum operating efficiency from every lamp in your oven.

The patented adjustable contour construction, which these ovens embody, permits the Patent-Flex oven to be shaped exactly to suit your requirements.

If you later change your product you simply re-shape the oven sections to maintain top efficiency.

Patent-Flex design permits tight multiple section joints, with each section individually adjustable from the outside.



When you buy a Patent-Flex oven "YOU KNOW" the shape will be exactly right. With non-adjustable ovens you "ONLY HOPE."

A complete line of large DRIVE-IN OVENS and small ROLLER TRAY OVENS.

ASBESTOS INSULATION conserves heat, and uses fewer lamps. The metal-backed asbestos panel construction keeps more Infra-Red heat in the oven.

High Efficiency, plus Low Prices. Patent-Flex Ovens are the lowest priced Infra-Red Ovens on the market. This is due to quantity standardized production, and the complete elimination of custom engineering.

DELIVERIES — RIGHT NOW

If you need a 30 or 40 Section Oven, we can ship in 3 or 4 days from large stocks.

To give you an idea of prices, the net price on the 6 Row Portable Caster Base, 48" long oven section, as illustrated, is $178.00. The 4 Row Straddle Section 48" long is $126.00 net. The 48" long Push-Thru Roller Tray Oven, complete with 4 (16" x 24") Trays is $167.00 net.

Ovens use R-40 lamps with hermetically sealed reflector, which never has to be cleaned. Obtainable from your wholesaler on your lamp contract.

Patent-Flex Ovens are sold and distributed nationally by:

GENERAL ELECTRIC SUPPLY CORP.
WESTINGHOUSE ELECTRIC SUPPLY CO.
GRAYBAR ELECTRIC COMPANY, INC.

For engineering advice write to

WIL-SON MANUFACTURING CO.

CLOVERPORT • KENTUCKY

perties may also enter into the performance characteristics of a finishing system.

The abrasion resistance of protective coatings is frequently of considerable importance. Several types of tests have been developed. Impact resistance of organic coatings is affected by the toughness or brittleness of the film, and its adherence to the base metal. Tests for the determination of resistance of coatings to impact are usually based on falling balls or hammers. It is usually good practice to record the character of the failure of an impact test in relation to other qualities. Impact resistance may be quite sensitive to the changes in thickness of the "cured" film. Figure 12 shows the Gardner Gage for measuring the thickness of attached films of protective coatings; this gage was designed and developed by Maynard R. Euverard of the Interchemical Corporation.

Fig. 12—The Gardner Thickness Gage being used to measure the thickness of organic coatings on test panels. The control of thickness of the cured films is important in evaluating the properties of coatings.
(Photo courtesy Henry A. Gardner Laboratory, Bethesda 14, Md.)

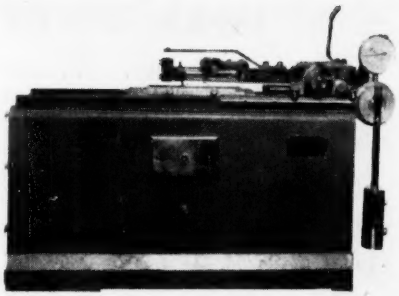


Fig. 13—Interchemical Adherometer; this instrument was developed in the laboratories of the Interchemical Corporation and is designed to measure the stripping force required to remove an organic finish from the surface of a metal test panel.
(Photo courtesy Henry A. Gardner Laboratory, Bethesda 14, Md.)

Recent developments have been made in methods for studying the adherence of organic finishes. Figure 13 shows the Interchemical Adherometer, an instrument also developed in the laboratories of the Interchemical Corporation, which is designed to measure the stripping force, in dynes, required to remove an organic finish from the surface of a metal test panel. A hard ivory cutting tool is held by a lever arm, which is weighted to hold the cutting edge firmly against the metal surface of the panel. The lever arm is connected to a weighted pendulum, causing it to swing outward to an extent proportional to the force being utilized in stripping the band of paint film. The amount of pendulum swing is read on a gage operated through a cam attached to the pendulum at its axis. In all adhesion tests the substrate is an integral part of the test, and its nature and preparation must be carefully reproduced. Instrumental methods of testing are becoming more and more important in guiding research in new products and formulations for the finishing industry.

There is only *one* PENTRATE . . . the oldest name in black oxide finishing. Since 1923, it has stood as the leader in uniformity, dependability and quality. Discerning metal finishers have used over *twelve million* pounds. This label is your assurance of reliability and continuous research for an even better product — insist on it!

Pentrate meets U. S. Gov. Spec. 57-0-2, Type III, Class A.

HEATBATH CORPORATION

•

SPRINGFIELD 1, MASSACHUSETTS

Highlights of the American Electroplaters' Society's Research Program

By DONALD PRICE

Director of Research, Oakite Products, Inc., New York City, and Vice Chairman, Research, A.E.S. Research Committee

EVALUATING a research program realistically is a very difficult undertaking. Obviously, it must be the purpose of every research project or program, sooner or later, to get results that will be useful to the company or organization that puts up the money to pay for it. But what do we really mean by getting useful results?

Perhaps we can make the matter clear by tying it down to our own research program and considering two possible, but very extreme, points of view. One type of individual may believe that getting useful results from research means coming up with a magic pill or elixir that when poured into his plating tank puts a quick end to all his plating troubles, no matter what they may happen to be. That kind of result cannot be achieved by research, or for that matter, by any other means. We may call this the ultra-practical viewpoint.

At the other extreme we have the individual who thinks that getting results out of research means putting in endless time and spending vast sums of money and, at long last, coming up with a complicated formula that even Einstein would have trouble understanding. But, if we could understand it, it might possibly be useful to electroplaters.

What the A.E.S. Research Committee is doing is seeking to strike a happy medium between the two extremes. If it devoted all its efforts to ironing out headaches for individual platers, it would not be fair to its sustaining membership as a whole. On the other hand, if it spent too much time delving into fundamental electrochemistry, it would not be likely, within any reasonable period, to come up with results that could be applied in practice.

The results that can be expected from any research are of several kinds. They may be either new products, improved methods and processes, or basic information to help us in our work. Inasmuch as the American Electroplaters' Society's Research Program is not concerned with bringing out new products, we may look to it either for better methods of testing and control or for fundamental information by means of which we can overcome some of our difficulties and improve the quality or lower the cost of your products.

At the present time the Research Committee has under its supervision eight active projects in various stages of advancement. As we know, the work of each of these projects is carried out in a university or Government laboratory by a Research Fellow under the immediate supervision of a Project Director who is a member of the university faculty or director of the laboratory.

Each project is supervised for the Society by a Project Committee consisting of a chairman and two other members who are American Electro-

Switch to

PLATECOIL for

(REPLACES PIPE COIL)

TROUBLE-FREE Tank Heating and Cooling

Platecoils have many times the useful life of pipe coils thus preventing many production delays. When repairs are necessary, plates are changed from outside the tank in a matter of minutes without dumping tank solution. You can save STEEL, MAN-HOURS and MONEY by using Platecoils and you will enjoy TROUBLE-FREE heating and cooling.

NEW Technical Manual No. P50 simplifies the solution of heat transfer problems. Send for your copy today.

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

TANK MAINTENANCE WITHOUT LOSS OF SOLUTION

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

LITERATURE

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

HIGH BTU TRANSFER

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Why Platecoils Cost Less

LOW FIRST COST

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

EASY INSTALLATION

By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

GREATER TANK CAPACITY

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

WEIGHS 50% LESS

Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

See Us At The Chemical Show, Booths 707-708

platers' Society members from industry. These committees meet once a month with the Project Director and Fellow.

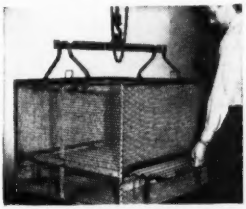
For purposes of the present survey, our active projects may logically be grouped together according to the similarity of their objectives. The first group is concerned with the properties of electrodeposits. It includes Project No. 9, "The Physical Properties of Electrodeposits," Project No. 6, "The Nature and Effect of Porosity in Electrodeposits," and the recently established Project No. 13, the purpose of which is to correlate the gas permeability of electrodeposits with their behavior in accelerated and atmospheric-exposure tests. The second group relates to the effect of various conditions upon electrodeposited coatings. It includes Project No. 5, "The Effect of Impurities and Purification of Electroplating Solutions," Project No. 11, "Current and Metal Distribution in Electroplating," and Project No. 12, "The Cleaning and Preparation of Metals for Electroplating." Project No. 2 may logically be placed in this group as it is concerned with "The Determination of Impurities in Electroplating Solutions." Project No. 10, "The Disposal of Plating Room Waste," stands in a class by itself.

In considering each of the active research projects in greater detail, we will follow for convenience the order in which they were listed. Project No. 9, "The Physical Properties of Electrodeposited Metals," is first in order. This project has extended over a period of four years and has involved a vast amount of painstaking work. The directors of this project have summarized their work so well that I can do no better than to quote their own words:

"Approximately 500 nickel deposits, about 0.01 inch thick, in sheet and tube form, were produced from 19 different bath compositions. For each bath the plating conditions, temperature, current density, and pH were varied over a wide range. The following more important physical properties were determined for most of the deposits: cathode efficiency, internal stress, density, hardness, tensile strength, elongation, modulus of elasticity, electrical resistivity, and magnetic properties. With the exception of cathode efficiency and internal stress these properties were measured in the as-deposited conditions and after heat-treatments at 400 and 1000 degrees C. Most of the deposits were analyzed for their content of cobalt, oxygen, hydrogen, and chlorine. In addition, bright-nickel deposits were analyzed for their content of carbon and sulfur. Photographs of the microstructure of the deposits were made in the as-deposited state and after heat treatment. Measurements were also undertaken on selected samples, representing the more important bath compositions, of the following physical properties: yield strength, endurance

FREE
BARREL
FINISHING
Advanced
BARREL
FINISHING
WHAT IT IS
HOW IT WORKS
WHO CAN USE IT
This 22-page booklet is guaranteed to open your eyes! It gives you the inside story of advanced barrel finishing as never told before!
Write Today For Your Free Copy.
ALKO Supersheen
AMERICA'S LARGEST MFGR. OF ADVANCED BARREL FINISHING EQUIPMENT, MATERIALS & COMPOUNDS
A-11
ALBERT LEA, MINNESOTA

why look further for special metal assemblies? call *Cambridge* your approved source for properly designed crates, racks, trays, baskets or fixtures -- expertly fabricated from any metal or alloy . . .



for processing your products or materials, in bulk, through liquids, heat, gases or corrosive agents.

Submit your own blueprints for quotation, or merely give us the details of the process for which the assembly must be designed. Our trained engineers and metalworkers will do the rest.

Look under "Baskets—Wire" in your Classified Telephone Directory to call your Cambridge Field Engineer, or write direct.

Ask for FREE folder describing Cambridge facilities for special metal fabrications.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department A
Cambridge 11, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

limit, internal friction, velocity of sound, thermal expansivity, specific heat, and heat of solution. X-ray structure of selected specimens was studied.

"The results for nickel deposits obtained in Project No. 9 may be summarized as follows: The bath variables most effective in influencing the physical properties are the bath composition and pH, and to a smaller degree the temperature and current density. It is shown that the composition of the nickel deposit is a function of the bath variables and is mainly responsible for the development of the characteristic crystal structure of the deposit. Most of the properties measured are in turn dependent on the structure of the deposit. The wide range of physical properties obtainable in nickel deposits and the essentially parallel trend of properties with the bath variables are demonstrated. With the information to be included in the final report it should be possible to produce, controllably, nickel deposits having any desired properties within the limits attainable. Such data should stimulate applications of nickel deposition in electroforming."

Under Project No. 6, which is devoted to the study of the "Nature and Effect of Porosity in Electrodeposits," a direct method for the measurement of the permeability of electrodeposited coatings has been developed. This method depends upon the rate of diffusion of gases through electrodeposited foils. It has been shown that thin foils of the order of 0.2-1.0 mil (about 5-25 microns) free from gross pores are permeable to an inert gas such as air, whereas wrought foils of the same order of thickness are impermeable.

The effects of exposure to corrosive atmospheres upon the permeability of electrodeposited foils have also been

---

A NEW tool developed by Loyd D. Cain, an assembly mechanic at Texas Engineering and Manufacturing Company, Inc., Dallas, Texas, has reduced the time required to strip strippable vinyl protective coatings from B-47 rear fuselage skins by approximately 70 per cent.

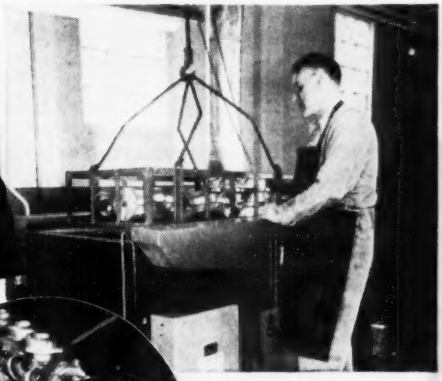
Cain's tool consists of a bottle with an air intake and two antenna-like dispensing tubes. The bottle is filled with the protective coating in liquid form and the amount dispensed by the antennae softens the edges of the area to be stripped just long enough to permit the stripping and then hardens to seal the remaining edges of the protective coating.

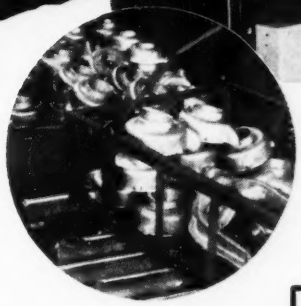
Additional advantages of this stripper are that it operates without any possibility of damaging the skin (previously a hot iron was used for stripping, and because of the critical nature of the operation it was only performed by leadmen) and it seals the edges of the stripped area, thus preventing the inadvertent stripping of additional skin areas.

ENGINEERED SERVICE

PHILLIPS

POWER TOOL MANUFACTURER CLEANS CASTINGS, STAMPINGS, MACHINED PARTS, FASTER AND MORE THOROUGHLY WITH A PHILLIPS DEGREASER





Above: Metal parts are thoroughly cleaned in Phillips high efficiency Model 60 degreaser. Inset shows condition of parts *after* degreasing.

Skilsaw reports improved cleaning before painting and assembly.

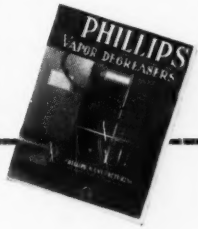
HERE is another case illustrating the high cleaning efficiency of Phillips degreasers. Skilsaw, Inc., Chicago, uses a Phillips Model 60 electric batch-type machine to clean both aluminum and iron castings, steel stampings, shafts and screw machine parts. These parts must be thoroughly cleaned before painting and assembly of the finished product. Among the types of soil removed are coolants, kerosene, drawing oils, and just plain shop dirt.

Skilsaw reports that the Phillips unit cleans their parts better, as well as 3 to 4 times faster than their former method. Thus production is speeded up and better control is assured over the quality of the finished product.

Check into the time and money you can save with Phillips Vapor Degreasing. Our representative will be glad to discuss your parts cleaning problem with you.

SEND FOR YOUR COPY OF THIS NEW BULLETIN

Describes and illustrates Phillips engineered metal cleaning equipment.



Phillips

3457 TOUHY AVENUE • CHICAGO 45, ILLINOIS

MANUFACTURING COMPANY

ENGINEERED METAL CLEANING EQUIPMENT

studied by the same method. In addition, efforts have been made to determine the size of the pores in such foils by means of their permeability to large gas molecules. While these results are as yet incomplete, it has been proved by the fact that sulfur hexafluoride, a compound with a relatively large molecule, diffuses through the foils, that the finest pores in the specimens examined must be larger than 18 billionths of an inch (4.5 A units) in diameter.

The more recent work under Project No. 6 has been directed toward developing a technique for following the rates of corrosion of electrodeposited coatings by analysis of the corrosion products. This method is quantitative and is free from certain objections which may be raised against the gas-diffusion method since it does not involve the removal of the electrodeposit from the basis metal.

One of the worthwhile accomplishments of Project No. 6 has been to reveal the existence of a variable that was not recognized until a few years ago. Call it permeability, porosity, or whatever you like; one thing certain is that if this condition is present in electrodeposits — and the evidence is very strong that it is — electroplaters should know as much about it as possible so as to be able to control it. It has never been clearly understood why there have been such wide variations in salt spray and weathering tests. This new variable, permeability, may be a possible explanation. Moreover, the methods of studying porosity developed under Project No. 6 should prove to be useful tools in increasing the reproducibility and significance of salt spray, outdoor exposure, and other accelerated tests.

Project No. 13 is the last project in the group devoted to the study of the properties of electrodeposits. Its object is to establish, if possible, a correlation between the gas permeability of electrodeposits and their behavior in accelerated and outdoor exposure tests; in other words, to determine the practical significance of the results obtained in Project No. 6.

We turn next to the second group of projects, those concerned with the effects of various conditions upon electrodeposits. Project No. 5, "The Effect of Impurities and Purification of Electroplating Solutions," will be considered first. About a year and a half ago, a critical review of the literature of the subject was published under this project. As a result of this search, the conclusion was reached that an extensive amount of work was needed before it would be possible to determine the effects of impurities on the physical properties of electrodeposited metals. There was only a very limited amount of information in the literature on the specific effect caused by the presence of a single impurity in a plating solution otherwise free from impurities.

Previous publications failed to describe the methods of purification of the solutions in enough detail to enable

FOR SILVERSMITHS, PLATERS, JEWELRY MFGRS., ETC.

Supplied in brass, steel or nickel silver wire in sizes .0025 - .006 or bristle, Nylon or fibre. Special sizes and shapes to order.

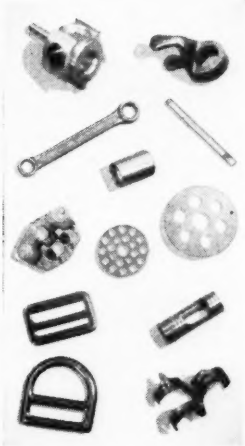
Write us (dep't. P) for catalog and price list, on your letterhead

DIXON & RIPPEL, INC. KINGSTON, N. Y.
ESTABLISHED 1856

ROTO FINISH

GIVES YOU 5 OUTSTANDING ADVANTAGES

for Deburring, Descaling and Finishing Operations



1. Eliminates tedious hand filing, scraping, polishing, deburring, etc. to save many man hours.
2. Provides absolute uniformity in quantity lots.
3. Maintains exacting tolerances on precision parts where no dimensional change is allowable.
4. Imparts a finish mechanically that was formerly considered possible only by hand methods.
5. Low initial cost — requires minimum maintenance. No exhaust systems required.

Send samples for free demonstration

ROTO-FINISH GUARANTEES RESULTS

HERE'S THE WAY IT WORKS

You buy nothing until analysis proves results will benefit you.

LABORATORY ANALYSIS

Your products are analyzed to determine which combination of equipment and materials will do the best job for you at the lowest cost . . . before you make any investment.

RESULTS GUARANTEED

We guarantee to reproduce the same results in your plant that we have produced on your samples processed in our laboratory.

A COMBINATION OF MATERIALS AND MACHINES

When you buy, you get machines and materials that are properly combined for your job.

Roto-Finish COMPANY

associated with The Sturgis Products Co.

3704 MILHAM RD., KALAMAZOO, MICHIGAN

ORIGINATORS OF THE ROTO-FINISH PROCESSES

ENGINEERING KNOW-HOW

Avail yourself of the unusual engineering skill and ability which is found at the Roto-Finish Company.

CONTINUOUS ENGINEERING SERVICE

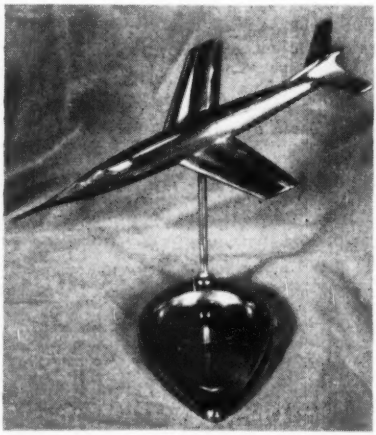
Roto-Finish Engineers make periodic visits to your plant to supervise and demonstrate the use of Roto-Finish processes, to train your operators, and to offer helpful suggestions to improve your products wherever possible.

ROTO-FINISH COMPANY, Kalamazoo, Michigan

them to be reproduced. It was, therefore, necessary to work out reliable methods of purification in order that the effect of known amounts of one impurity at a time could be studied.

A first paper on the effects of copper as an impurity in nickel plating solutions was published in November 1950. The effects of this impurity on the forementioned physical properties of nickel deposits are clearly shown. A second paper on zinc as an impurity is being revised, and the study of the effect of iron in nickel plating solutions is nearly complete. The effect of chromium as an impurity in nickel baths is now under investigation. The experimental technique required to get reproducible results in the work of this project has proved to be very exacting, and on this account the reports from this project do not indicate the amount of work done.

Metallurgists and aeronautical engineers predict that titanium, "lightweight champion of all metals," will be number one material for plane construction in the future. Workers at the Allegheny Ludlum Steel Corporation titanium plant in Watervliet, N. Y., got the jump on the field by fashioning a model airplane entirely from titanium. The model was presented to a retiring employee by the workers.



Project No. 2 devoted to "The Determination of Impurities in Electroplating Solutions" is closely related to Project No. 5. The purpose of the latter project is to determine how much of an impurity we can tolerate and still get a satisfactory plate. But we must have accurate analytical methods to find out the amounts of impurities present in our plating solutions. That is supplied by Project No. 2.

Project No. 2 is now turning to the study of the determination of the ingredients in plating room wastes. In time this field of investigation should be just as profitable as the work already concluded under this project.

Project No. 11, "Current and Metal Distribution in Electroplating," deals with an extremely difficult phase of electroplating, the ever-present problem of knowing how to space anodes and get uniform distribution over irregularly shaped objects. The question of how to rack the work for this purpose is more or less a cut-and-try proposition. Much waste of time and materials has resulted from the want of a better procedure. Project No. 11 is an attempt to determine if a simple formula can be derived to solve the problem mathematically rather than by trial and error.

A critical review of the literature covering the subject has already been published in "Plating". This survey discloses the fact that while much work has been done on fundamentally similar problems in fields unrelated to electroplating, the existing mathematical methods are only capable of solving the simplest problems. It has been found necessary to attack the problem experimentally. The first paper covering experimental work under this project is now being completed.

Project No. 10, which has as its object the study of methods for the disposal of plating room wastes, has been placed in a class by itself. There is no

OK
FOR MILITARY PRODUCTION

For Government Specification 57-0-2C

Type II . . . Class C

USE HOUGHTON

HOUGHTO-CLEAN 313-A

FAST-ACTING METAL CLEANER

HOUGHTO-CLEAN 313-A prepares metals for finishing *as it cleans.* Removes soil, oils, compounds and other coatings swiftly. Leaves a light, tough film on metals that provides extra adhesion for paint, lacquer and other finishes. This film also resists corrosion if finish is scratched or broken. You need no special tank or equipment to use Houghto-Clean 313-A. Order a drum of this economical metal cleaner from the Houghton Man or write to E. F. Houghton & Co., Philadelphia 33, Pa.

Latest data sheet mailed promptly on request.

HOUGHTO-CLEAN 313-A
. . . a product of

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

need today to emphasize the importance of waste disposal; it is a headache in every industry. Local and state authorities are cooperating with authorities of the Federal Government in a campaign to eliminate stream pollution and contamination of water supplies, as well as to get rid of such contaminants as cyanides, copper, and chromium which interfere with the operation of sewage disposal plants. State and Federal agencies are tightening up regulations all along the line, and violators are subject to severe penalties.

There may be an inclination to believe that waste disposal is a job for the consulting engineer to be called in as disposal problems arise. However, with few exceptions, consulting engineers will not have a background in electroplating and are likely to be unfamiliar with the special problems of this industry. If detailed information relating specifically to waste disposal problems in the plating industry is not available, the consulting engineer will have to learn at the plater's expense. It is the object of Project No. 10 to provide platers and engineers with such information that waste disposal problems may be solved in a minimum time and at a minimum cost.

In this brief survey I have tried to summarize and highlight the accomplishments of our research program during the last year or so. The American Electroplaters' Society is the leading organization devoted to electroplating; it also plays a leading part in research in this field. The fact that it can do so is made possible by the generous support of its Sustaining Members, by the capable work of the Fellows and Project Directors, and last, but by no means least, by the untiring efforts of the chairmen and members of the Project Committees, who give their time so generously to serve the electroplating industry.

—Adapted for publication in PRODUCTS FINISHING from a paper presented at the 38th Annual A.E.S. Convention.

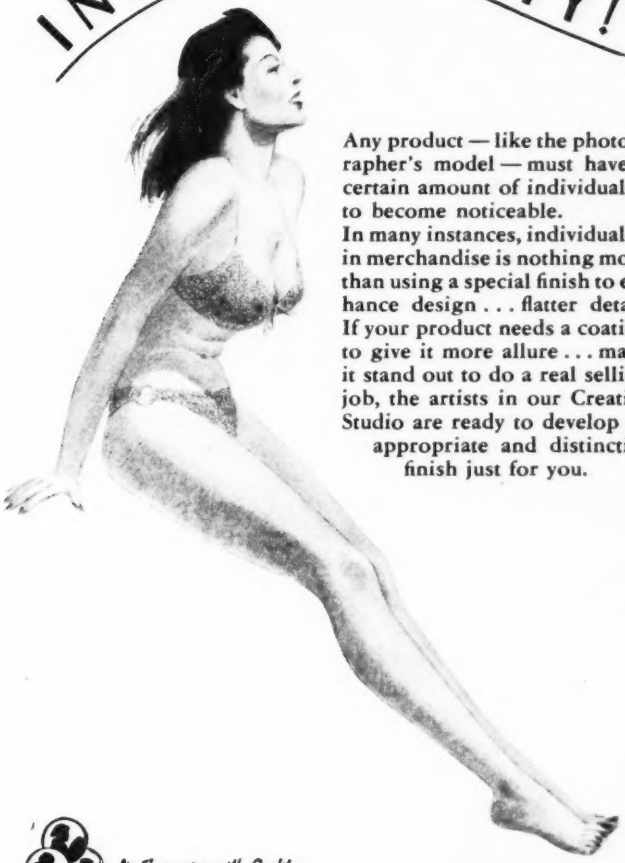
McKeon's
"Liquid Sulphur"
FOR COPPER STRIPPING NON-DANGEROUSLY
Economical, Non-Electrolytic.
No special equipment required.
Write for descriptive brochure.
Sulphur Products Co., Inc.
GREENSBURG 8, PA.

Soon door knobs, hinges, and other building hardware may be available in distinctive new designs and dozens of different colors. The material: lifetime porcelain enameled steel. The hardware may be decorated with over-glaze decals, stencils, hand painting, and other porcelain enamel art techniques. The design on the highly durable finish never will fade or wear away.

Butyl titanate and other esters of titanic acid are reported to be showing promise as vehicles for high-temperature paints. Used alone as a coating, butyl titanate does not dry in the manner of most conventional paints, but hydorlyzes rapidly to brittle, non-adherent titanium dioxide. When inorganic pigments are incorporated, however, the titanium dioxide is said to cement them into a dry, highly heat-resistant finish which has worked well as a protective coating. Exposure tests of a paint system consisting of two coats of butyl titanate-zinc dust followed by two coats of butyl titanate-aluminum paint is claimed to have been successful on smoke-stacks and exhaust pipes. Trials are now underway to determine the resistance of these coatings to sea water.

Contentment makes poor men rich; discontent makes rich men poor.—*Ben Franklin.*

INDIVIDUALITY!



Any product — like the photographer's model — must have a certain amount of individuality to become noticeable.

In many instances, individuality in merchandise is nothing more than using a special finish to enhance design . . . flatter detail. If your product needs a coating to give it more allure . . . make it stand out to do a real selling job, the artists in our Creative Studio are ready to develop an appropriate and distinctive finish just for you.

No Tampering with Quality

ROCKFORD VARNISH *Company*
ROCKFORD, ILLINOIS
Manufacturers of Protective and Decorative Coatings

Affiliate
GORDON BARTELS CO.
Roller Coating Specialists

PITTSBURGH INDUSTRIAL FINISHES

● **No matter what type** of protective coatings you need for your defense orders—Pittsburgh Industrial Finishes serve you best in a number of ways.

● **These famous finishes** do more than faithfully follow government specifications. Often they give you a plus over minimum requirements . . . provide longer service and better performance.

● **Pittsburgh** has the research and technical skill—as well as many years of experience in working with varied industries—to enable it to adapt specification materials that will assure trouble-free application under the production conditions prevailing in your plant.

PITTSBURGH PLATE

for your defense contracts

● **Add to these** advantages Pittsburgh's wide-spread facilities—which make it possible to supply finishes promptly everywhere—and you'll realize why Pittsburgh Industrial Finishes will best serve your defense production needs.

PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

FREE ADVISORY SERVICE

Pittsburgh maintains a highly trained staff, with years of experience in working with industry, whose specialty is solving unusual finishing problems. Whenever you need help, a phone call, wire or letter will bring a Pittsburgh representative to your office for consultation—without obligation on your part.

Industrial FINISHES
GLASS COMPANY

Finishes

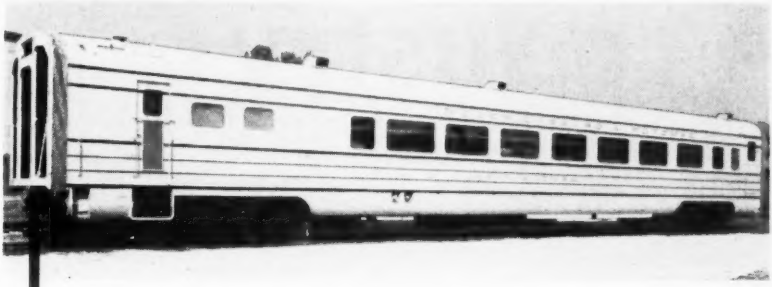
The DoAll Letter Opener is made of steel and mounted on rubber-protected feet. It is finished with a baked-on Hammertone office gray. The handle of the steel knife is nickel plated.

(Photo courtesy Buckens Manufacturing Co., Bridgeport, Conn.)

The handy and attractive quarter-round open shelf cabinet is of all steel construction. The central post is chrome plated as are the strips placed along the edges of the shelves. The top has a stainless steel back splash and rolled stainless steel edges. All other surfaces are finished with a baked-on white enamel.

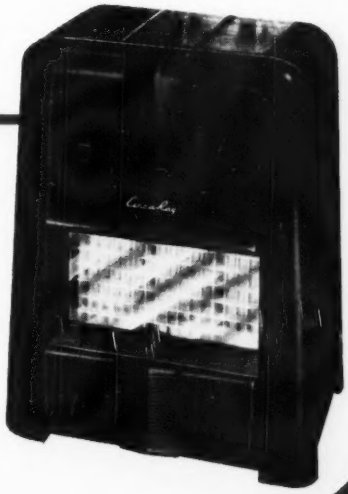
(Photo courtesy Mullins Manufacturing Corp., Warren, Ohio)

that aid in appearance and utility



The modern Parlor-Cafe Car, a good example of today's rolling stock, has its steel roof and sides finished with Du Pont Dulux Gray with blue stripes. The lettering is in gold leaf protected by clear lacquer.

(Photo courtesy American Car and Foundry Co., New York 8, N. Y.)



The attractive gas heater is finished with "Canyon Mist" porcelain enamel, a type which combines the ground and finish coat. A mixture of copper red and oyster pearl in color, it blends with any home decorative scheme.

(Photo courtesy Tennessee Enamel Manufacturing Co., Nashville 9, Tenn.)

NEWS of the Industry

COMPANIES

THE LEA MANUFACTURING CO., Waterbury, Conn., manufacturer of an extensive line of finishing compositions and equipment, has announced a selling agreement with the Clair Manufacturing Co., Olean, New York, whereby Lea will handle the sale of Clair Special Polish Machinery to plating and finishing plants throughout most of the country. This machinery is used for special polishing and glazing operations.

NUTMEG CHROME CORPORATION, hard chrome specialist plating shop, has announced the removal of its plant and offices from Chapel Street, Hartford, to new and enlarged quarters at 111 Vanderbilt Ave., West Hartford, Conn. Art Logozzo, well known electroplater and a past president of the American Electroplaters' Society, is the owner of the corporation.

The formation of a company to be known as **NORTON BEHR-MANNING OVERSEAS, INCORPORATED**, was announced recently by Norton Company of Worcester, Massachusetts, and Behr-Manning Corporation of Troy, New York. The company will handle all the export business and direct the subsidiary plant operations of these two corporations throughout the world. Headquarters will be in Worcester with branch offices located in New Rochelle, New York, and New York City.

Norton is the manufacturer of grinding wheels and abrasive products, and Behr-Manning, a subsidiary of Norton, manufactures coated abrasive products.

The directors of this new company, who are also directors of Norton Company or Behr-Manning Corporation, include: Milton P. Higgins, Ralph F. Gow, Herbert A. Stanton, Elmer C. Schacht, A. Donald Kelso, and Henry M. Elliot.

Officers are: president, Herbert A. Stanton; executive vice president and general manager, A. Donald Kelso; vice presidents, Philip N. Cooke, Paul A. Krumdieck, Frank M. Ryan, Jules A. Schaetzel, and Henry J. Sheehan; treasurer, William J. Magee; assistant treasurer, Joseph P. Morano; and secretary, Curtis M. Clark.

BLAKE PAINT CORPORATION recently opened a manufacturing plant at 2494 South Kuhl Avenue in Orlando, Florida, it was announced by Dudley B. Blake, president. Executive offices will be maintained at this address. The corporation was formed over a year ago to supply industrial finishes, consisting of lacquers, paints, synthetic enamels, thinners, and vinyl coatings. All accounts north of the Mason-Dixon line will be serviced by Blake's other factory at 115 Woodworth Avenue, Yonkers, New York.

A program of new production facilities for the manufacture of vitrified and resinoid bonded grinding wheels has been approved by the National Production Authority for **SIMONDS ABRASIVE CO.**, Philadelphia, Pa. The project includes an additional continuous tunnel kiln instal-

lation, with building to house it, for the production of vitrified bonded products and an additional complete production line setup for the manufacture of resinoid bonded wheels.

Also included in the project are extensive air conditioning, electrical wiring, and materials handling equipment installations. Substantal installation and construction work is currently in process.

The corporate title of the **STANDARD VARNISH WORKS** has been changed to **STANDARD-TOCH CHEMICALS, INC.**, according to a recent announcement.

Standard Varnish Works, Toch Brothers, Inc., and their subsidiaries have now become divisions of Standard-Toch Chemicals, Inc.

METALS DISINTEGRATING COMPANY, INC., Elizabeth, N. J., manufacturer of metal pigments, metal powders, and metal abrasives, has announced the appointment of The Roy A. Ribelin Distributing Company, 570-A M. & M. Building, Houston, Texas, as distributor for MD Aluminum Pastes and Powders and Gold Bronze Powders in southeastern Texas.

C. M. Buhler, Jr., manager of the Houston office of the Roy A. Ribelin Distributing Company, will be in charge. Warehouse stocks of standard MD pigments will be maintained in Houston.

With the call for faster production in the country's factories—and more and more precise and fragile parts being specified, planning engineers are finding that the extra cost of tough, yet soft rubber and synthetic covering on material handling equipment is being paid for quickly in savings on rejects.

While **AUTOMOTIVE RUBBER COMPANY,** Inc., 8601 Epworth Blvd., Detroit 4, Michigan, merchandises very few across-the-counter items, their engineers have been a factor in the development of rubber-cushioned handling baskets, pans, spacers, chutes, hooks, racks, and so forth, making it possible to safely handle larger quantities of parts faster and without slippage, marring and scratching.

Even the precision inspection on Air Corps and Army Ordnance parts can be satisfied when handled with rubber protection using ARCO's seamless dip process or sheet lining. Product control can be effected with the purest of rubber or with synthetics where unusual conditions are to be met.

Rubber covered handling trays.

NEW POSITIONS

Lasalco, Inc., St. Louis, Mo., has announced the appointment of **BURTON G. DAW** to chairman of the board and **HERMAN J. STRUCKHOFF** to president.

Mr. Daw, president since 1938, will continue with the company as a sales engineer and in an advisory capacity.

Mr. Struckhoff joined Lasalco in 1930, working as a draftsman, engineer, and salesman. In 1943, he became vice president and sales manager, which position he has held until his present appointment. He has assumed active management of the company and remains sales manager.

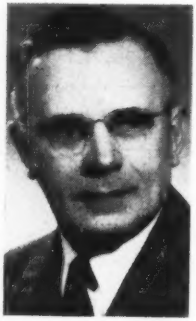
ROBERT W. RIGNALL, who has been with the company since 1945, has succeeded Mr. Struckhoff as vice president.

E. O. Robson, president of the Midland Industrial Finishes Co., Waukegan, Ill., has announced the addition to the laboratory staff of **DR. JOHN J. RUSSELL** as director of special research with particular emphasis in the field of silicone chemistry.

Dr. Russell previously was vice president in charge of production for the National Glaco Chemical Corporation, subsidiary of Ekco Products Company.

He graduated from the University of Toronto and also received his master's degree in chemistry and doctor's degree there.

Dr. Russell is a Fellow of the Chemical Institute of Canada and a member of the American Chemical Society.

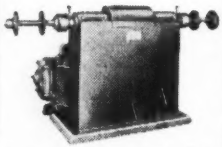


Joseph F. Janecke

JOSEPH F. JANECKE has been appointed manager of Ferro Corporation's New-Products Division. Until this appointment, he was Ferro's service manager.

A graduate engineer from Tri-State College, Angola, Indiana, Mr. Janecke is a specialist on problems of welding and design of porcelain enamel products. He joined Ferro in 1926.

IS YOUR PROBLEM POLISHING?



HOLLAND SUGGESTS: Twin motor double spindle vee belt drive heavy duty buffing and polishing lathe. 3-15 H.P.

Contact our technical staff on your metal finishing problems. Write for FREE folder "M" showing our wide selection of metal finishing equipment.

J. HOLLAND & SONS, INC.

MANUFACTURERS • DEALERS

276 SOUTH NINTH ST. • BROOKLYN, N.Y.

HARRY F. ALLEN, has joined the sales force of Hanson-Van Winkle - Munning Co., Matawan, N. J., and will make his headquarters at Cleveland.

Formerly a chemist in the plating laboratory of the National Cash Register Company, Mr. Allen attended the University of California and the University of Washington, from which he graduated with the degree of B. S. in chemistry.

Harry F. Allen

The appointment of **JACK H. DOLLINGER** as sales manager has been announced by the Glyco Products Co., Inc. Brooklyn, N. Y. He has been acting as assistant sales manager and technical assistant to the executive vice president since 1946. Prior to this he was associated with the research and development laboratories of the company.

Mr. Dollinger is a Fellow of the American Institute of Chemists and a member of the American Chemical Society.

The Buckeye Products Company, Cincinnati, has announced the appointment of **C. M. FERNEKES,** 125 Rexford Drive, East Grand Rapids, as its representative in western Michigan.

Long active in the Michigan territory, Mr. Fernekes will handle the complete line of Speedie Buffing and Polishing Compositions.

DR. HAROLD L. MAXWELL, supervisor of General Consultants, E. I. du Pont de Nemours & Company, Inc., Wilmington, Del., has been elected a vice president of the American Society for Testing Materials by the board of directors to fill a vacancy that existed in the board. He will serve through the Society's 50th Anniversary Meeting in New York City, June 1952.

Active in ASTM work for many years, Dr. Maxwell was a director for three

years ending in 1950. He holds memberships also in a number of national societies in the fields of chemistry, metals and metallurgy, welding, and experimental stress analysis.

Robert B. Goodsell

ROBERT B. GOODSELL has been appointed sales and service representative for Enthone, Inc., of New Haven, Connecticut, in the Middle West. His address will be in care of Ardco, Inc., 6665 S. Nashville Ave., Chicago.

Mr. Goodsell has spent 24 years in the field of electroplating and metal finishing and is widely known for his activity in the American Electroplaters' Society.

A professorship in chemical engineering has been established at Carnegie Institute of Technology through a grant from the **COLUMBIA - SOUTHERN CHEMICAL CORPORATION**, a subsidiary of Pittsburgh Plate Glass Company. Holding it will be Dr. Carl C. Monrad, professor and head of the Department of Chemical Engineering.

Dr. Monrad, who joined the Carnegie faculty as an associate professor of chemical engineering, became a full professor in five years and was made head of his department in 1947. At present he is a consultant to the Office of Rubber Reserve of the Reconstruction Finance Corporation in Washington, D. C.

EMMET C. THOMPSON, who rose from superintendent of a plant to general manager of the Grasselli Chemicals Department during his thirty-four years with the Du Pont Company, retired at the end of September, it was announced.

CLARK W. DAVIS, assistant general manager of the Grasselli Chemicals Department since 1942, has been named to succeed Mr. Thompson.

MEETINGS

The **DETROIT BRANCH** of the **AMERICAN ELECTROPLATERS' SOCIETY** announces its annual meeting and banquet which will be held at the Hotel Statler in Detroit on November 30 and December 1.

The annual educational session will occur on Friday evening, November 30. The educational session will consist of a symposium on modern methods for the electrodeposition of copper. The cyanide, acid, and pyro-phosphate baths will be discussed with special emphasis on variations of these processes to achieve smooth, dense, lustrous deposits. The program is as follows: "The Cyanide Bath" by Dr. A. K. Graham; "PR Application to the Cyanide Bath" by B. C. Case; "The Pyro-Phosphate Bath" by Dr. Jesse Starеck; and "The Bright Acid Bath" by William Innes.

Tickets for the annual banquet, scheduled for Saturday evening, December 1, may be obtained from O. H. Tiedeman, 526 Catalpa Drive, Birmingham, Michigan, at $10.00 each.

Preliminary plans for the 1952 Annual Conference of the **NATIONAL ASSOCIATION OF CORROSION ENGINEERS** were made at a meeting of the Association's executive committee. The conference, to be held at Galveston, Texas, March 10-14, 1952, will be the first held in the Southwest since 1944. Exhibits and meetings will be held on the Galveston Pleasure Pier, while the Buccaneer Hotel will be convention headquarters hotel.

Eight technical symposia, a general corrosion session, and two round table or panel discussion sessions are planned for the technical program.

The **PHILADELPHIA BRANCH, A.E.S.**, will hold its Annual Educational Session and Banquet on Saturday, November 17, at the Broadwood Hotel.

Beginning at 1:30 p.m., the Educational Program will be as follows: Dr. William Blum, National Bureau of Standards, "Summary of Electrodeposition Researches at the National Bureau of Standards"; C. F. Nixon, Ternstedt Division, G.M.C., "Decorative Chrome Plating Without Nickel"; G. S. Mustin, Bureau of Aeronautics, Navy Department, "Corrosion Prevention By Plating and Surface Treatment in Naval Aircraft."

The fall meeting of **THE GALVANIZERS COMMITTEE**, sponsored by the American Zinc Institute, will be held at the St. Francis Hotel, Canton, Ohio, on Thursday and Friday, November 15 and 16.

According to L. C. Flickinger, Youngstown Sheet & Tube Company, chairman of the Governing Board, the highlight of the meeting will be an inspection trip through the plants of Republic Steel Corporation.

NECROLOGY

CALVIN STERLING, head of the Analytical Section of the International Nickel Research Laboratory at Bayonne, New Jersey, died October 1 at the age of 49.

Mr. Sterling had been associated with The International Nickel Company, Inc., since his graduation from Pennsylvania State College in 1925. Until 1930 he was a chemist at the Huntington, West Virginia Works of the company. He was transferred to its Bayonne Works in 1930, and since 1935 had been head of the Analytical Section of the Research Laboratory at Bayonne.

Mr. Sterling had taken an active interest in the advancement of technical development of standard methods of metallurgical analysis. He was a member of the American Chemical Society and of the American Society for Testing Materials.

GUY M. COLE, well known process engineer at the Ternstedt Division of General Motors Corporation, Detroit, died suddenly Friday, August 10. He had just returned from the Annual A.E.S. Convention in Buffalo where he acted as a Technical Sessions Chairman.

Mr. Cole was very active in A.E.S. affairs and was an officer of the Detroit Branch.

Guy M. Cole

Standard of the FINISHING INDUSTRY for 17 years.

DETROIT HANDY "TAC" RAG

DETRO MFG. & SALES CO., INC., CULVER CITY, CALIF.

ADOLPH BREGMAN, nationally known consulting engineer in the field of metal finishing, died suddenly at his home in New York City on Monday, October 15, of a heart attack.

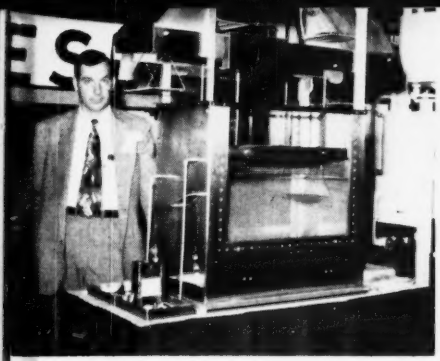
Mr. Bregman was executive secretary of the Masters Electro-Plating Association, author of many papers, and co-author of the book, "Finishing Metal Products."

meetings

OF INTEREST TO FINISHERS

Nov. 26-Dec. 1. 23rd Exposition of Chemical Industries, Grand Central Palace, New York, New York.

June 16-20. 3rd Industrial Finishing Exposition and 39th Annual Convention, American Electroplaters' Society, International Amphitheatre, Chicago, Illinois.



The 33rd National Metal Congress and Exposition and First World Metallurgical Congress were held in Detroit, October 13 to 19. Approximately 350 firms had exhibits covering nearly 6½ acres of floor space.

Fig. 1—(Above, left) A view of the G. S. Blakeslee & Company booth showing a model degreaser and solvent still in the background.

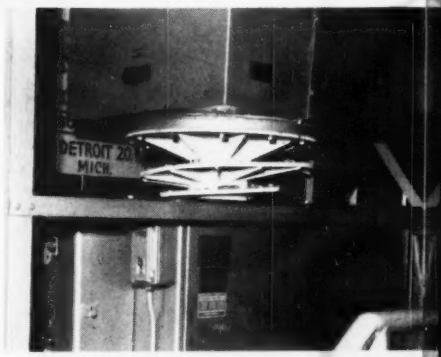
Fig. 2—(Above, right) A shot of the Hammond Machinery Builders, Inc. exhibit. S. H. Miller and H. J. Kingsbury, manager and chief engineer, are shown in front of a combination buffing lathe and backstand belt grinder.

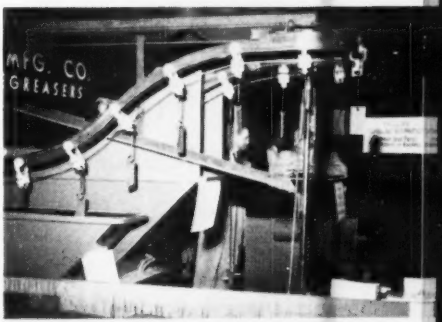
Fig. 3—(Right) A vapor degreaser without a conveyor, developed by Manufacturers Processing Company, was introduced to the industry for the first time at this showing.

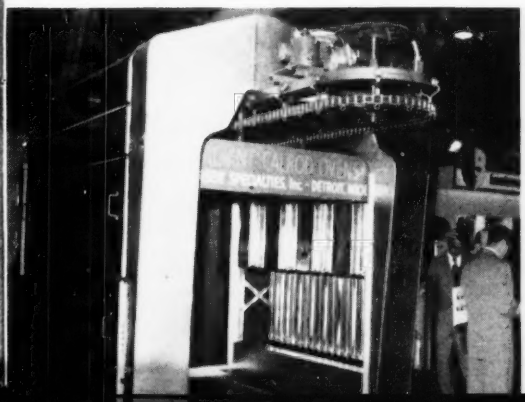
Fig. 4—(Right) The exhibit of the Phillips Manufacturing Company consisted of a model finishing system and other metal cleaning equipment.

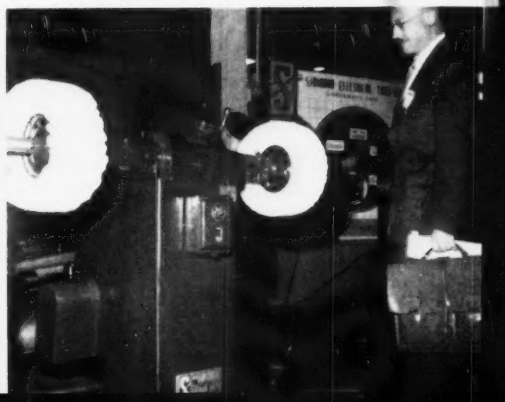
Fig. 5—(Right, below) Jean Miton, Paris, France, is shown inspecting a buffing lathe on exhibit by the Standard Electrical Tool Company.

Fig. 6—(Left, below) A shot of the Jensen Specialties, Inc. booth showing a model of the Radiant Calrod Ovens.



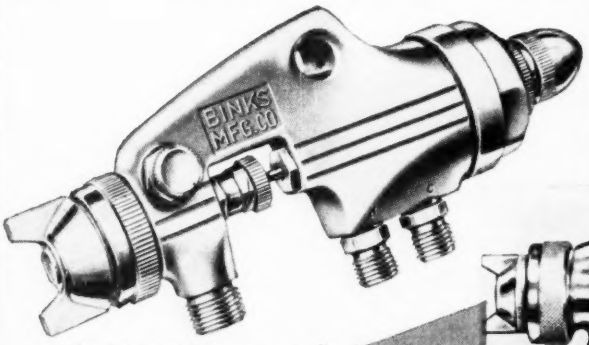




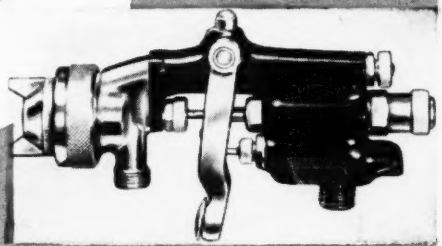


AUTOMATIC

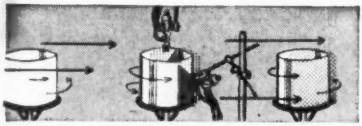
The answer to cost reduction



Model 21 Binks automatic spray gun—
designed for pneumatic operation in Binks Spindle Machines.

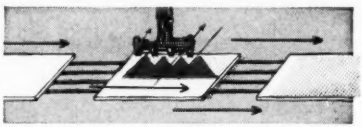


Model 7R automatic spray gun—
designed for mechanical operation in Binks Reciprocating Machines.



Binks automatic spindle machine

Finishes round, cylindrical, many-sided or hollow products...inside and/or outside. The product spins in front of Binks Model 21 guns. Guns cut off automatically between units and do not spray when empty spindles pass.



Binks automatic reciprocating machine

Designed for finishing flat surfaces such as table tops, range parts, outdoor signs, and many other products. Mechanical arms sweep Binks Model 7R guns back and forth across the conveyor. Guns cut off between units, thus saving paint.

FINISHING

on many products

Binks automatic spray guns increase productivity of your manpower

Binks heavy-duty, automatic spray finishing equipment brings finishing costs down to a new low. At the same time, it improves the quality and uniformity of your finishes. Adaptable to almost any product ranging from many-sided objects to flat panels... Binks automatic guns operate like magic. They start and stop automatically. Starting is instantaneous without spitting or dripping. Virtually no supervision is needed when these guns are at work. Hour after hour, they apply beautiful, uniform finishes of precise film thickness.

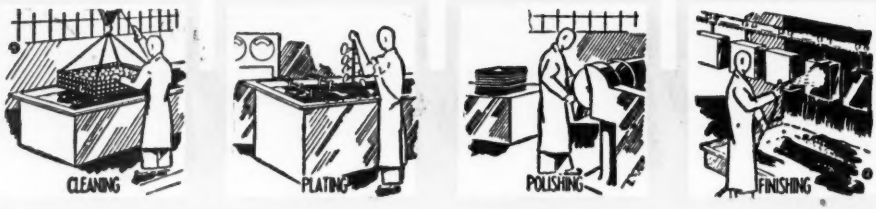
An invitation—Send or bring samples of your product to Binks' Laboratory. Tests will be run on automatic equipment to determine exactly what economies can be expected. There is no obligation for this service.

"Better machines are the best answer to increased Production costs." Burke B Rock President

Binks MANUFACTURING COMPANY

3118-40 Carroll Avenue, Chicago 12, Ill.

NEW YORK • DETROIT • LOS ANGELES • ATLANTA • BOSTON • CLEVELAND • DALLAS • MILWAUKEE • NASHVILLE
PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • WINDSOR, ONTARIO, CANADA



New • EQUIPMENT • MATERIALS • PROCESSES

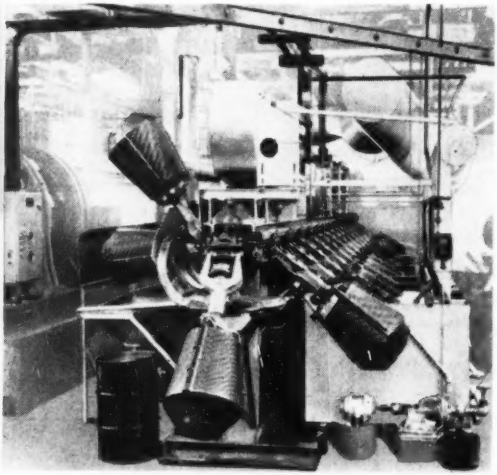
Full Automatic Barrel Plating Machine

Development of a full automatic barrel plating and processing machine, the Stevens Super"E", has been announced by Frederic B. Stevens, Inc., Detroit 16, Mich. A larger version of the Stevens Model "C" Machine, the Super "E" was developed primarily as a supplement to the Model "C" Machine in installations where requirements call for plating and processing in large volume.

Basically, the Super "E" is a continuous rotating barrel-type machine. Barrels revolve continuously through the entire cleaning, plating, rinsing, and drying cycle. Barrels are much larger, however, in the new machine than those of the Stevens Model "C" units.

Operation of the unit is entirely automatic. The only manual process required is the loading of the barrels at the beginning of the plating cycle, and this can be eliminated through the application of a mechanical loader offered by Stevens as auxiliary equipment. Because of the nature of the machine, it fits in ideally in modern materials handling installations where mechanical conveyors move work pieces through the plant, the company states.

The machine can be installed as an integral part of the materials handling system and thus eliminate virtually all labor, other than supervision and maintenance of plating baths, from the processing or metal finishing of work parts.



Stevens Super "E" Full Automatic Barrel Plating and Processing Machine

"Tarlac" Protective Coating

Coal tar pitch has been compounded by a recently developed process into a fast drying protective coating by breaking it down into minute molecules, then combining it with water and a stabilizing emulsification agent to form a permanent suspension that can be brushed or sprayed.

Available under the trade name "Tarlac" this coating is said to retain all the excellent protective and adhesive qualities of coal tar pitch, to be impervious to oils, greases, other petroleum derivatives, acids, alkalis, water and condensation. It will not crack at low temperature or run at high temperature. Good from —56 to 200 deg. F., it is recommended as a protective coating for concrete structures and floors, metals exposed to corrosive elements, mastic floors or other black top surfaces, and also for other general protective purposes.

Available from Flash-Stone Co., Inc., 30 E. Rittenhouse St., Philadelphia 44, Pa., "Tarlac" dries to a tough, enduring, flat black film, is completely insoluble in water, oil or gasoline, is thinned when necessary with water and is said to cover up to 300 sq. ft./gallon.

Gilab Suppressor "F"

Guild Laboratory, P. O. Box 3194, Barnum Station, Bridgeport, Conn., has announced an addition to its line of chemicals known as Gilab Suppressor "F."

When the suppressor is sprayed on top of alkali baths, it disperses foam suds completely. Its use is said to impart an important safety factor by preventing implosions which are common to electric cleaners. Also, the company states, it permits air agitation without overflowing tanks or clogging air vent ducts. Foam in tumbling barrels can also be controlled by this chemical.

Furnished with a spray syringe applicator, Gilab Suppressor "F" is non-acid, and does not neutralize as vinegar does.

"Rustshield 2"

Moving parts made of iron and steel can get two-fold protection with a chemical treatment announced by Octagon Process, Inc., 15 Bank Street, Staten Island 1, N. Y. Known as "Rustshield 2," it is a phosphatizing compound which changes steel and iron surfaces to rustproof, highly absorbent non-metallic areas and meets the requirements for phosphate coatings in the U. S. Army Ordnance Specification 57-0-2C, Type II, Class A.

Such a "Rustshielded" steel surface, with increased surface area, is an ideal base for the retention of lubricating oils and metal parts so treated will remain properly lubricated far longer than smooth steel surfaces. Danger of scuffing and galling is virtually eliminated and break-in time is greatly reduced.

According to the company, close tolerances are not affected by the phosphate treatment. The oil-retentive qualities of

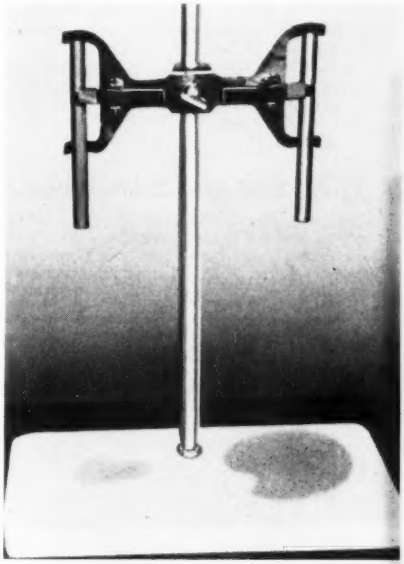


Illustration shows two cold-rolled steel rods after 5 cc. of oil was poured over them. The rod at the left had been treated with "Rustshield 2" and the other remained untreated.

a treated metal surface are due to the microscopically small "hills and valleys" formed during the process.

Rustshielding is a simple immersion process which consists of precleaning with vapor degreaser, safety solvent, or an alkali cleaner especially designed for cleaning prior to phosphating (such as Octagon 400). Cleaning is followed by rinsing, Rustshielding, rinsing, and final treatment with a passivating agent, such as Neutralyte solution.

Porcelain-Like Enamel

A porcelain-like enamel, designed to withstand the rigors of outdoor life, and which provides long-lasting resistance to the weather and abrasion, has been developed by the United Lacquer Manufac-

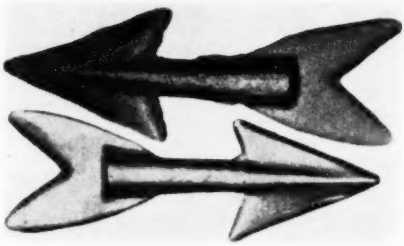
turing Corp., 1001 W. Elizabeth Ave., Linden 8, New Jersey.

The enamel provides excellent resistance to the weather, chipping abrasion, mechanical abuse, salt-spray, alcohols, and acid solutions, it is said. It will prove particularly valuable for use in outdoor installations where the atmosphere contains a high concentration of corrosive materials, such as sulfur.

Porcelan-amel will also find application in finishing medicinal and chemical cabinets, tables, and other hospital and laboratory equipment.

Barrel Finishing Compound

A special purpose chemical for barrel finishing brass, bronze, copper, gold and silver stampings, castings, machined and drawn parts is offered under the trade name Blue Magic Compound No. 1 Double Strength by Blue Magic Chemical Specialties Co., 2135 Margaret St., Philadelphia 24, Pa. This compound is a highly concentrated paste for use in very small quantities and is said to yield beautifully uniform metallic colors and finishes in extremely short time cycles.



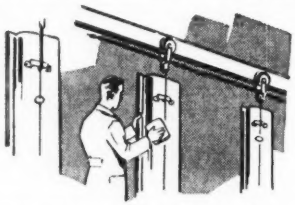
"Before and after" view of a bronze casting which has been deburred and finished with Blue Magic No. 1

Blue Magic No. 1 is recommended by the manufacturer for finishing either with or without media, and with selected non-ferrous media for roughing, deburring, cleaning, and finishing in a single operation. Recommended quantities are 4 ounces of compound for finishing runs in a 32 x 30-inch tumbling barrel at high water level. As a cutting compound in deburring operations, only 1 to 2 ounces of compound at low water level in the barrel are needed.

Principal advantages claimed are fine finish, uniform metallic colors, and greatly reduced time cycles on all operations.

DUST-ALL Tack Rag

for better, cleaner finished jobs



Remove the specks, lint, dust from surfaces to be painted; wipe them off with a Dust-All Tack Rag; be sure of fine, blemish-free, finished jobs.

Get the Dust-All Tack Rag in the familiar Red Checkered Bag; also available in 150-250-500 yard rolls.

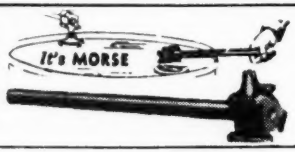
HARDING *Manufacturing Co.*

10634 GRATIOT AVE.
DETROIT 13, MICH.

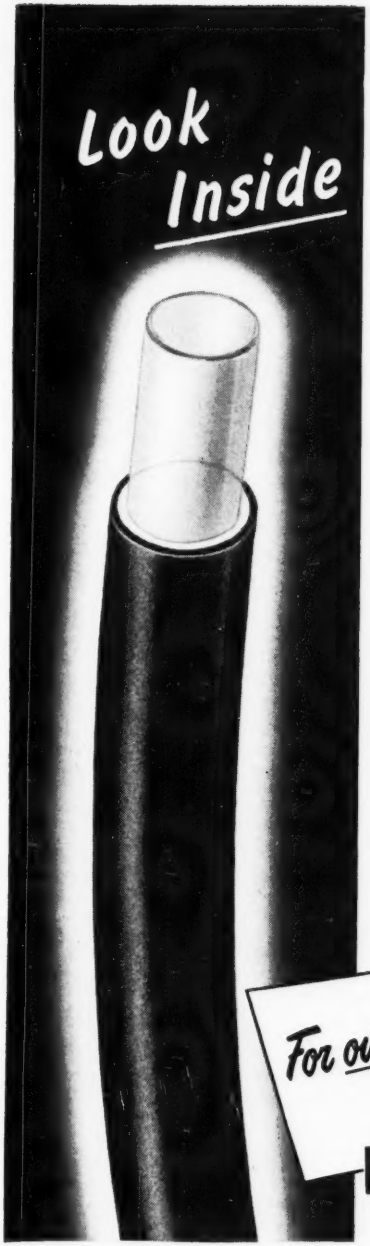
For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Send NOW for this FIT-ALL DRUM PLUG WRENCH

Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!



THOUSANDS IN USE saving time, labor, accidents!
SATISFACTION GUARANTEED.... **$3.00**
Non-sparking type $4.60
Plus Parcel Post
MORSE MFG. CO., Inc.
125 Dickerson, Syracuse 2, N.Y.



RESISTOFLEX Hot Spray Hose

...and you'll see why it can give exceptional service in

HOT SPRAY FINISHING

On the surface, Resistoflex hose looks like any other hose. But what a difference internally! Only Resistoflex hose has the *compar tube.*

This flexible, high tensile synthetic tube is practically *impermeable* to all strong solvents commonly used in lacquers, synthetics and enamels, including aromatics, esters, ketones and chlorinated solvents. Result: no swelling of the tube; no clogging of spray guns due to erosion; longer hose life.

Resistoflex Industrial Finishing Spray Hose withstands high gun pressures. It flexes without collapsing yet handles easily. It fits reusable couplings on conventional spray equipment. WRITE FOR DATA SHEET—Resistoflex Corporation, Belleville 9, N. J.

For out of the ordinary engineering with synthetics

RESISTOFLEX

Trade-Mark Reg. in U.S. & Can. Pat. Off.

RESISTOFLEX

CORPORATION

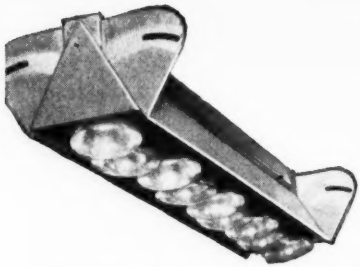
Belleville 9, New Jersey

Infra-Red Strip Unit

A single or multiple-row infra-red heating unit has been announced by the Wil-Son Mfg. Co., Dept. PF, Cloverport, Kentucky.

These strip heating units are available in 24, 32, and 48 inches, are equipped with asbestos insulation to provide maximum heating efficiency, and have adjustment ear lugs projecting out from both sides, which permit any number of the units to be joined together, both side by side, and end to end. Various socket spacings are available. For example, the 48-inch unit is supplied with six, eight, or nine sockets.

A complete line of attachment feet and other mounting bracket accessories can be had. Sockets are mounted in stagger arrangement, which provides an overlapping, perfectly smooth heat pattern, the manufacturer states.



Wil-Son Infra-Red Strip Unit

These units are designed for use with high efficiency R-40 heat reflector lamps, and are constructed of heavy gauge zinc coated steel, which is unaffected by heat. Units are designed primarily for building into special locations where a conventional infra-red oven would not be suited.

Park
No. 290
BLACKENING
SALT

Black Oxide finishing for rust resistance and decorative parts. Speedy black coating in water solution with no electric current. Permanent black finish on ordnance parts, tools, aircraft, bearing races. Dazzling black decorative finish for television cameras, business machines, hardware, metal screens and machine parts. Excellent bond for paints and enamels. Simple one bath operation. Write for bulletin H-16. Park Chemical Co., 8074 Military Ave., Detroit 4, Mich.

Bright Zinc Process for Still Tank Plating

Introduced to the plating industry by the research laboratories of Hanson-Van Winkle-Munning Co., Matawan, N. J., is a bright zinc process, BSZ-300, a simple method of producing bright to brilliant deposits directly from the plating bath. Bright dipping is not essential. Parts plated by this process not only appear brighter, but they stay bright longer and have higher resistance to oxidation and tarnish. The use of BSZ-300 is said to provide greater corrosion protection for plated parts as well as sharply increased visual sales appeal.

According to the company, this bright zinc process requires no special equipment of any kind. It is based on use of the BSZ-300 Brightener as an additive to the regular cyanide solution. Requiring only low concentration in the plating bath and having a low consumption rate, BSZ-300 can be used right from the start. This solution may be used with equally satisfactory results over a broad range of cur-

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

deep hardened and polished carbon steel

BURNISHING MATERIALS

for superior barrel finishing of

Military and Civilian parts and products

Abbott barrel finishing experts are ready to help you solve your burnishing problems with five scientifically designed shapes which make effective contact on parts, stampings and castings of every size and shape.

Write for details. No obligation.

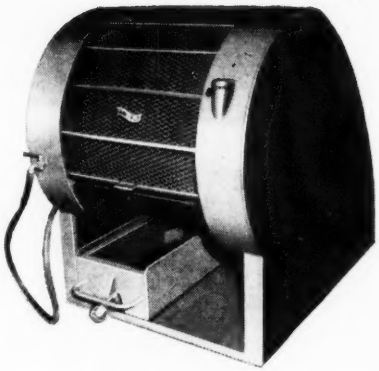
THE ABBOTT BALL COMPANY
1064 New Britain Ave.
Hartford 10, Conn. U.S.A.

rent densities, and has exceptional tolerance for impurities. It accepts conversion coatings and can be soldered with comparative ease. In addition to non-critical operation and control, it possesses excellent covering power, it is claimed.

Model 36-2 Tumbling Machine

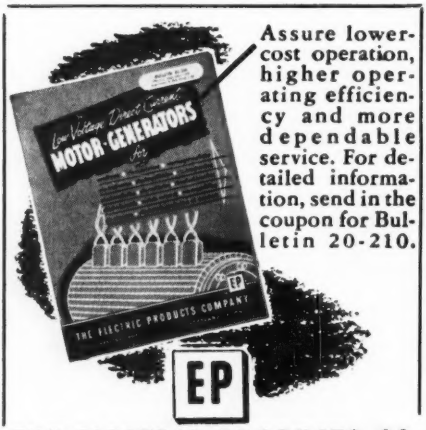
The Grav-i-Flo Corp., 400 Norwood Ave., Sturgis, Mich., has introduced its Model 36-2 Tumbling Machine. With two 18 by 40-inch I.D. compartments, the unit offers increased capacity per area of floor space, thus permitting the grinding, deburring, and finishing of metal parts in large quantities and in rapid time cycles.

Other outstanding features of the unit listed by the company are: compartments are furnished with ½-inch plate unlined or ¼-inch plate rubber-lined; doors have cam locks with manually released safety stops to provide pressure relief; magnetic starter has a reduced voltage control to meet plant electrical standards; standard lever or an optional push button switch; a limit switch on the safety guard cuts off current to stop barrel rotation when guard is lifted. The 220-440 volt, 5 h.p. motor has a magnetic brake.



Grav-i-Flo Model 36-2 Tumbling Machine

Water and electrical services are integral with the machine and available for instant, convenient connections. Safety guard is counterbalanced for easy lifting. Hoist pan has tubular yoke with unusually operated lock.



Assure lower-cost operation, higher operating efficiency and more dependable service. For detailed information, send in the coupon for Bulletin 20-210.

EP

THE ELECTRIC PRODUCTS CO.

• 1741 CLARKSTONE ROAD • CLEVELAND 12, OHIO •

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

X-73

Long Lasting Heating Coils and Heat Exchangers

Tantalum heating coils that possess several outstanding advantages are now supplied by United Chromium, Incorporated, 100 E. 42nd St., New York 17, N. Y. Heat exchangers also are available, utilizing the tantalum tubing. Both coils and exchangers can be obtained in standardized units or made to order.

Unichrome Tantalum Heating Coils and Unichrome Tantalum Heat Exchangers are virtually acid-proof, resistant to all of the acids commonly found in the plating room, except straight hydrofluoric acid. Tantalum is especially recommended for chromium plating solutions or alloy heat exchangers generally used, the advantage being not only long life but also freedom from the corrosion and sealing that form heat-insulating coatings. Tantalum tubing stays clean and shiny, and while excellent for acid solutions, should not be used in alkaline baths where ordinary iron or steel serves well.

According to the company, tantalum possesses heat conductivity better than steel and is superior to any lead alloy. The great strength of tantalum permits the use of tubing with thin walls, and good conductivity plus thin walls provide

STANTITE
the wash primer
that *stands behind*
your finish
STANTITE Spraying Primer and STANTITE Clear Primer (for dipping) offer outstanding resistance to corrosion and rust creep, as compared with conventional wash primers. They provide excellent adhesion to all types of metallic surfaces and may be used with most types of top coats. Created for application under air-dried or baked finishes, STANTITE dries rapidly . . . is unimpaired by any baking schedules. Result: your finish looks like new through added years of product use.
Find out now what STANTITE can do for your product . . . for complete information write today to the Stanley Chemical Company, 21 Berlin Street, East Berlin, Connecticut.
STANLEY
Industrial Coatings
STANLEY CHEMICAL
LACQUERS SYNTHETICS JAPANS ENAMELS

fast heat transfer with minimum lag and therefore ensure much closer regulation of bath temperatures, it is stated.

Unichrome Tantalum Heating Coils and Unichrome Tantalum Heat Exchangers can be used for both heating and cooling, and are not subject to damage from thermal shock. This longer service life not only cuts down on replacement coils but also reduces the loss of solution through coil failure.

Concave Roller Conveyor

A concave roller conveyor, designed especially for handling all types of cylindrical objects such as shells, has been announced by The Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, Ohio, manufacturer of engineered conveying equipment and engineered coordinated conveying systems.

Due to its concavity, the conveyor is said to keep the cylindrical objects in the center of the conveyor line and prevent them from slipping to either side or sliding off. Consequently, for handling most cylindrical objects, guard rails are no longer necessary, and objects can be placed on or removed from this concave roller conveyor more quickly and easily, it is stated.

Concave Roller Conveyor

The conveyor is made of No. 10 gauge steel tubing, and is available with a $\frac{7}{16}$-inch shaft for ordinary work or a $\frac{1}{2}$-inch shaft for heavy duty work. The rollers can be furnished with rubber coverings, if desired, to prevent scratching and for complete protection of the objects moving along the line. Both straight and curved sections of A-F Concave Roller Conveyors are available.

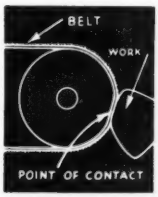
Looking for a Better Finish?
Try
HARRISON'S
4A
TAILOR-MADE BUFFING & POLISHING COMPOUNDS
for
Aluminum, Brass, Copper, Stainless Steel, Carbon Steel, Etc.
EMERY CAKE, GREASE STICK
CEMENT AND THINNER
for setting up wheels, belts, and rolls
HARRISON & COMPANY, INC.
Haverhill, Massachusetts

Gardner
FILM THICKNESS GAGE

• Write for descriptive leaflet and prices.
GARDNER LABORATORY
Bethesda • Maryland

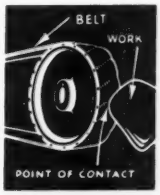
How to Use a Grinding Belt Until it is WORN OUT

Usually contact grinding belts are discarded with plenty of life left in them. Insufficient flexing of the belt by ordinary grinding wheels result in them "loading up" or glazing with the result that they become inoperative long before their grit is worn off. Moreover, these ordinary belts cause the grit to be presented to the work always in the same way so that it presently becomes dull and round .



CONVENTIONAL WHEEL

A properly designed and *engineered* CHICAGO RUBBER WHEEL constantly works the belt in a short wave flex that keeps the belt clean. Moreover this short wave flex constantly varies the angle at which each piece of grit is presented to the work. This grit wears into facets like those on a diamond . . . stays sharp down to the very end.



SERRATED WHEEL

Try This Simple Test . . . .

Take an old, discarded belt. After changing your ordinary wheel for a CHICAGO RUBBER WHEEL, place this old belt into use. This belt will not only clean and resharpen itself in use . . . it will *cut better and run longer* than it did when it was new. New belts, used with the CHICAGO RUBBER WHEEL have had a useful life of as much as *ten times* that of those used on ordinary wheels.

Remember

The engineering know-how that has designed the finest contact wheels ever made is at your disposal. For an answer to your contact grinding and polishing problems. Contact us.

"IT'S THE WHEEL THAT DOES THE WORK"

MAKERS OF THE COSMOWHEEL

CHICAGO RUBBER COMPANY

2620 N. CLYBOURN AVE., CHICAGO, 14

PRODUCT LITERATURE

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Metal Plating Facilities. American Nickeloid Co., Peru, Ill., has prepared a booklet illustrating more than 50 common peace-time applications of its pre-plated metals and its switch to war production during World War II. Enumerated in detail are the company's machinery, tools, presses, power, dock facilities, and so on, available in its two plants' 151,000 square feet.

Plating finishes offered are copper, chromium, nickel, and brass on such bases as steel, brass, copper, aluminum, tin plate, nickel silver, and zinc. If necessary, American Nickeloid can expand its finishes to include zinc, cadmium, silver, and anodizing aluminum.

Powerful, direct-connected (no gears), 3450 r.p.m., 100-120 v AC air-cooled motor. All sealed ball-bearing construction. Die-cast aluminum housing, polished. All-position handles. In hand weight only 5 lbs. Insulated with ground wire for wet as well as dry sanding or rubbing. Available accessories—deep contour pads, surface plates, felts, etc. Takes any sheet abrasives—3 covers 4½" x 6½" from standard 9" x 11" sheet.

A time saving quality tool priced so every worker can have one.

Write for Circular

SpeedWay MANUFACTURING CO.
1895 So. 52nd Ave., Cicero 50, Ill.

ACP Reference List. A quick reference list of rust proofing, paint bonding and metal protective chemicals and processes is obtainable from the American Chemical Paint Co., Ambler, Pa. The purpose, characteristics, advantages, and effectiveness of ACP chemicals and processes are given in **Technical Service Data Sheet No. P-100-21 (revised May 1951).**

Paint bonding phosphate coating chemicals to be applied by either spray, dip, or brush are discussed in detail, and numerous examples are given showing the correct application of these products to steel, iron, zinc, and aluminum. Applicable government specifications for these and other ACP products are included in the data sheet.

"6 Ways To Increase Heat Treating Production" is the subject of a folder released by The Cambridge Wire Cloth Co., Cambridge, Md. The folder contains a complete flow sheet for heat treating of auto spring assemblies and presents a detailed description of where Cambridge woven wire conveyor belts may be used to best advantage in this type of processing. All recommended conveyor belt installations, of course, are adaptable to heat treating of any type of product. The operating conditions encountered at any given station are essentially the same regardless of the nature of the end product.

Zinc Conversion Coatings. United Chromium, Inc., 100 E. 42nd St., New York 17, N. Y., has available a brochure entitled **"Chromate Type Zinc Conversion Coatings"** in which are described two methods of obtaining corrosion-resistant conversion coatings on zinc plate and zinc die castings.

Unichrome dips, a chemical process, and Anozinc, an electrolytic process which produces its finish by anodic treatment of the zinc plate, are described with reference to coatings obtained, economies achieved, operating procedures, and colors that can be produced in the coatings.

Grinding Know-How. A four-page colorful folder, available from the Norton Co., Worcester 6, Mass., describes and illustrates its 16 booklets of helpful information on grinding plus the company's monthly magazine; 12 motion pictures in sound and color; and the week-long courses in the Norton School of Grinding.

Modern Filtration Equipment. Bulletin 691, released by the R. P. Adams Co., Inc., 220 E. Park Dr., Buffalo 17, N. Y., covers the company's line of filters. Discussing, with illustrations, the manufacturing of these filters, the bulletin also dwells on general filtering practices and advantages that are to be gained through their use.

Another part of the bulletin explains, with multi-color flow diagrams, the action of the filters, typical installations of single and multi-stage units, and automatic controls for filtering systems.

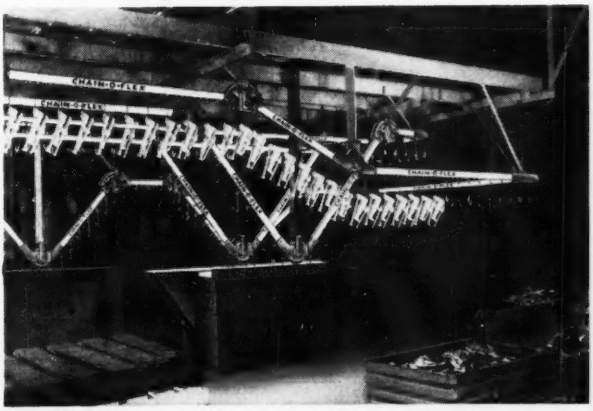
Practical ways to prevent industrial accidents and fires are contained in the National Safety Council's 800-page **"Accident Prevention Manual for Industrial Operations."** Popular response to the first edition, issued four years ago, was so great that work was begun immediately on an expanded second edition. Just off the press, it contains 256 more pages and 11 more sections than the first.

The second edition was researched and written by Council staff men who are specialists in the fields covered, then sent to qualified reviewers for analysis.

The book is confined principally to safety in the manufacturing industry, and is based on the premise that a major proportion of all accident causes are common to all industry. In addition to the table of contents, each section of the book lists its own contents. There also is an exhaustive alphabetical index. The manual is bound in green and the cover has a bold design stamped in gold. Description and price may be obtained by writing the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

"Engineering for Electroplating in the Graphic Arts," by R. F. Ledford, covers the many details to be considered in the design of a plating tank; the electrical equipment involved with its effects on related problems; the comparative efficiency of aluminum and copper bus bars, and such other matters as temperature and connections, electrifying a tank, con-

CHAIN-O-FLEX CONVEYOR



- CHAIN-O-FLEX CONVEYOR offers—in one simple system—a maximum of flexibility, safety and economy—Low installation cost and maintenance.
- All corners are quickly adjustable to any desired dip or angle.
- Easily assembled by any mechanic.

Write for 16 page illustrated catalog.

INDUSTRIAL EQUIPMENT CO.

369 N. ADA ST. CHICAGO 7, ILL.

trols, and so on; heating and cooling solutions; solution agitation; semi-automatic and full-automatic plating. Reprinted from 1950 issues of "The Electrotypers & Stereotypers Bulletin," it is available from the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

"Nukem Acid, Pickling, and Storage Tanks" is the title of a pamphlet released by Nukem Products Corp., 110-120 Colgate Ave., Buffalo 20, N. Y. In this pamphlet Monolithic Brick and Monolithic Construction are illustrated and explained. In plain language the pamphlet explains why this product and its method of use are so effective in construction of pickling, acid, and storage tanks.

Automatic pickling lines and still pickling tanks are pictured; the photographs showing the wide application of Monolithic Brick.

No. 2 Electrostatic Process. The Ransburg Electro-Coating Corp., 1234 Barth Ave., Indianapolis 7, Indiana, has issued a booklet describing its new method of applying finishes. An explanation of the process and its scope as to type of article, type of materials, production rate, and so on, are given. Also included are pictures of installations of this process together with engineering data pertaining to the specific installations.

"Liquid Envelope" Strip Coating. Better Finishes and Coatings, Inc., 272 Doremus Ave., Newark 5, N. J., has issued the first six of a series of Technical Data Sheets on various "Liquid Envelope" formulations. Additional sheets will be issued as data on new formulations become available. Technical Data Sheets available for immediate distribution are: No. 5291 AL—Peelable Cold Spray for protecting aluminum; Nos. 5377 and 5268—Opaque Peelable Cold Spray for protection of work in process in the metal working industries; No. 6510—Peelable Cold Spray for protecting magnesium and other light metals; No. 3178—Permanent clear protective film; and No. 5396-2—Peelable Spray Booth Coating.

These sheets contain precise factual information on uses, application method, solids content, adhesion, viscosity, chemical resistance, tensile strength, elongation, storage and stripping instructions and other useful data on each "Liquid Envelope" formulation.

Keep spray booths safer from

FIRE!

. . . with non-inflammable,

BOOTHCOTE

Makes frequent cleaning easy. Spray Boothcote on clean booth. When desired, operator peels off overspray in sheets. Advocated by insurance companies.

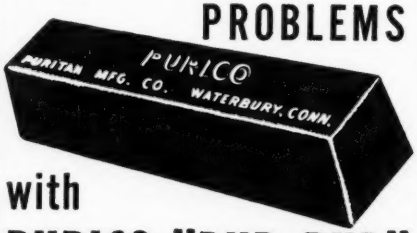
- Saves time and labor
- Time-proven for 14 years
- Premixed, ready to use
- Does not flake off
- Safe to store
- Can be brushed or sprayed

Money-back trial offer: 5 gals. $6.25 f.o.b. Buffalo or write for Circular.

HYGRADE FOOD PRODUCTS CORP.

Boothcote Div., 16 Stetson St., Buffalo 6, N. Y.

PUT AN END TO YOUR BURRING PROBLEMS



with

PURICO "PUR-BUR"

PUR-BUR, new self-lubricating compound swiftly removes burrs, gouges, minute cracks—yet retains accurate finishes. Lasts longer, is more economical than ordinary polishing wheel. Available in cake and tube form.

WRITE TODAY FOR COMPLETE INFORMATION

THE PURITAN MFG. CO.

WATERBURY, CONN.

The No. 41 LIFTING HOOK

. . . is primarily designed for drums, although it may be used for barrels. The hook consists of double steel rods and a malleable steel hook with 3 inch diameter welded ring. Lifting capacity is 1000 lbs.

MORSE

"ROCK-A-DRUM" VERTICAL TRUCK

WHEELS TO ANY LOCATION!

Specially engineered for use with drums which can be drained only in a vertical position. The Morse Truck is easily locked into dispensing position by one man. The weight of the load is evenly distributed over the four wheels and adequate clearance is provided under pouring spout.

Write for Bulletin 949

Model #44

MORSE MANUFACTURING CO., INC.

125 Dickerson Street Syracuse 2, N. Y.

Rubber Gloves. The Pioneer Rubber Co., 685 Tiffin Rd., Willard, Ohio, has available a 20-page brochure describing and illustrating its line of rubber gloves. Made of Neoprene rubber, the many different kinds and sizes of these gloves are depicted and discussed.

"Lasalco Ball Burnishers" is the title of an eight-page catalog available from Lasalco, Inc., 2818-38 La Salle St., St. Louis 4, Mo. The catalog lists and depicts four sizes of burnishing barrels that are available. Belt or motor-driven, the specifications of the barrels are tabulated in a large table. Similar information is also given on motor and electric tumblers.

Several paragraphs are devoted to the process, the preliminary preparation of articles and operations. Burnishing shapes and specifications and drying materials are included.

Enthone Equipment and Accessories are the subject of a four-page brochure which depicts and discusses such equipment as racks, heating coils, plating tanks, rectifiers, and exhaust hoods. Available from Enthone, Inc., 442 Elm St., New Haven, Conn., the brochure also lists the services the company has available to the industry.

The Finishing Touch — **By J. A. Patterson**

"I dunno——Whatta' you make of it???"

Opportunity Section

1—Paasche Automatic Spraying equipment, with 2 water wash booths, each with 15 foot conveyors, rotating spindles and removable fixtures. Equipped with explosion proof motors throughout. Has dual mixing tanks and airbrushes. Used very little. Like brand new. Very reasonable. Write Box No. 111, c/o PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

PLATING SUPERVISOR to supervise copper, nickel, and chrome operation. Must be well experienced and capable of directing employees in the above operations. Plant located northeast of Indianapolis.

HARDY MANUFACTURING CORP.
Pendleton, Indiana

SOUTH FLORIDA TEST SERVICE

Testing—Inspection—Research—Engineers

Consultants and specialists in corrosion, weathering and sunlight testing.

4201 N.W. 7th St., Miami 34, Florida

AUTOMATIC POLISHING & BUFFING EXPERIENCE covering varied products combined with capacity to work and willingness to travel part time are primary requirements for man not over 45 to fill opening in progressive, well established machinery organization. Tell us about yourself. Box No. 113, c/o PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

This Opportunity Section is available for classified advertisements. For advertising rates and other information address:

PRODUCTS FINISHING

431 MAIN STREET, CINCINNATI 2, OHIO

DISTRICT SALES MANAGER—*Ohio Area*—To market metal treating compounds: phosphating materials, cleaners, rust removers, strippers.
We want an aggressive man with a solid technical background and good contacts in manufacturing plants. The competition is tough, but you will be selling a superior product. Excellent opportunity with growing organization. Please write fully—all replies will be held in strict confidence. Sales Manager, OCTAGON PROCESS, INC., 15 Bank Street, Staten Island 1, N. Y.

FOR SALE

ONE YOUNG BROS. CONTINUOUS TYPE ENAMELING AND JAPANNING OVEN AND PALMER BEE BAR CONVEYOR.

Inside dimensions of oven 6'9" wide, 13'4" high, 60' long (at top). Overall dimensions 31' high, 48' long and 7'8" wide. Conveyor rods 6', spaced 12" centers, 105 ft. between sprockets. Complete with 4000 gallon dip tank, 4500 gallon fire tank, cleaning tank, pump, foamite piping, gas heater, exhaust motors and controls. B/P on request. Equipment subject to inspection at plant in Northwestern Ohio. Available immediately. Write box No. 112, Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

MOTOR GENERATOR SET

AVAILABLE IMMEDIATELY

Used 40 volt, 750 ampere H.V.W.M. direct current generator driven by 50 H.P. induction motor with direct connected exciter, motor starter and disconnect switch all mounted on common steel base. Equipment includes panelboard with generator controls. Priced for immediate sale.

HUCK MANUFACTURING COMPANY
Phone Walnut 1-6207 A. H. Kolb
2480 Bellevue Detroit 7, Mich.

INDEX TO ADVERTISEMENTS

Abbott Ball Co. 117
Allied Research Products, Inc. 27
Almco Div., Queen Stove Works, Inc. 90
Alsop Engr. Corp. 72
Alvey-Ferguson Co. 8
American Chemical Paint Co. 41

Baker & Co., Inc. 43
Baughn Chemical Products Co. 30
Bede Products, Inc. 57
Behr-Manning, Div. Norton Co. 9
Better Finishes & Coatings, Inc. 70
Binks Mfg. Co. 110, 111
Blakeslee & Co., G. S. 6

Cambridge Wire Cloth Co. 91
Carborundum Co. ..... Third Cover
Ceilcote Co. 72
Chemsteel Construction Co., Inc. 46
Chicago Rubber Co. 121
Cincinnati Cleaning & Finishing Mchry. Co. ..... Second Cover
Clair Mfg. Co., Inc. 38
Coated Coil Corp. 17
Cowles Chemical Co. 10

Detrex Corp. ..... Fourth Cover
Detro Mfg. & Sales Co., Inc. 108
Dixon & Rippel, Inc. 94

Egyptian Lacquer Mfg. Co. 4
Electric Products Co. 118
Exolon Co. 29

Ferro Enamel Corp. 79

Gardner Laboratory, Inc., Henry A. 120

Haas-Miller Corp. 58
Hanson-Van Winkle-Munning Co. 3, 64, 65
Harding Mfg. Co. 114
Harrison & Co., Inc. 120
Harshaw Chemical Co. 71
Heatbath Corp. 87
Hisey-Wolf Machine Co. 63
Holland & Sons, Inc., J. 106
Houghton & Co , E. F. 97
Hygrade Food Products Corp., Boothcote Div. 124

Industrial Equipment Co. 123
Industrial Filter & Pump Mfg. Co. 34
Industrial Washing Machine Corp. 19
International Nickel Co., Inc. 25

Kay & Ess Co. 61
Kellogg Div., American Brake Shoe Co. 20, 21
Keystone Emery Mills 116
Koch Sons, Inc., George 83
Kold-Hold Mfg. Co. 89

Maas & Waldstein Co. 33
Minnesota Mining & Mfg. Co. 45
Miracle Paint Rejuvenator Co., Inc. 48
Morse Mfg. Co., Inc. 114, 125
Murray-Way Corp. 77

Neilson Chemical Co. 73
New York Blower Co. 75
Nopco Chemical Co., Inc. 37
North American Electric Lamp Co. 44
Norton Co. 2

Oakite Products, Inc. 1
Osborn Mfg. Co. 35

Park Chemical Co. 116
Parker Rust Proof Co. 59
Pelron Corp. 81
Phillips Mfg. Co. 93
Pioneer Rubber Co. 76
Pittsburgh Plate Glass Co., Paint Div. 100, 101
Potter Paint Co., Inc. 68
Puritan Mfg. Co. 124

Randolph Products Co. 55
Resistoflex Corp. 115
Rockford Varnish Co. 99
Roto-Finish Co. 95

Sherwin-Williams Co. 50, 51
Siefen Co., J. J. 47
Speedway Mfg. Co. 122
Stanley Chemical Co. 119
Stevens, Inc., Frederic B. 31
Strand Div., N. A., of Balmar Corp. 69
Striplastic Co. 18
Sulphur Products Co. 98

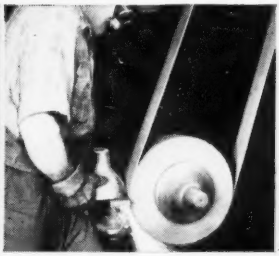
Triangle Equipment Co., Inc. 26

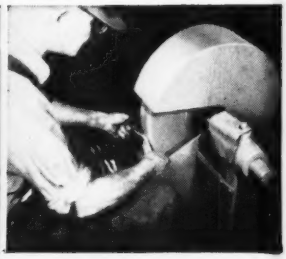
Udylite Corp. 7
United Chromium, Inc. 49

Wallace & Tiernan Co., Inc. 67
Wilbur & Williams Co. 39
Wil-Son Mfg. Corp. 85

New "61" CONTACT WHEEL by CARBORUNDUM TRADE MARK

. . . improves Belt Performance!





You, too, can expect and get better performance plus up to twice the life from abrasive belts by CARBORUNDUM. Only one simple change in your present method is required. Use your same backstand grinder and abrasive belt, but install a serrated "61" Contact Wheel by CARBORUNDUM at the "business" end. CARBORUNDUM'S new "61" Contact Wheel provides higher rates of stock removal, extends productive life on the belt, as well. Belt glazing is virtually eliminated. Your CARBORUNDUM representative will give you full details, and will be glad to arrange an impartial production test.

Only CARBORUNDUM TRADE MARK

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N. Y.

makes ALL Abrasive Products . . . to give you the proper ONE

82-131

in your spray washer

DETREX 53
makes short work of dirt

You save time . . . make short work of cleaning . . . when you use a spray-washer compound that's right for your job.

On steel, cast iron, magnesium and die castings, Detrex 53 is right! You get the best removal of oils, grease, shop dirt, chips, and other soils . . .

And these plus advantages:

★ *NO FOAMING* ★ *NO DUSTING* ★ *NO ODOR*

★ *EASILY RINSED* ★ *COMPLETELY SOLUBLE*

✓ LIKE PROOF? — *Write Now!*

111

DETREX *Corporation*

BOX 501, DETROIT 32, MICH.